FOUNDRY TRADE JOURNAL

EST. 1902

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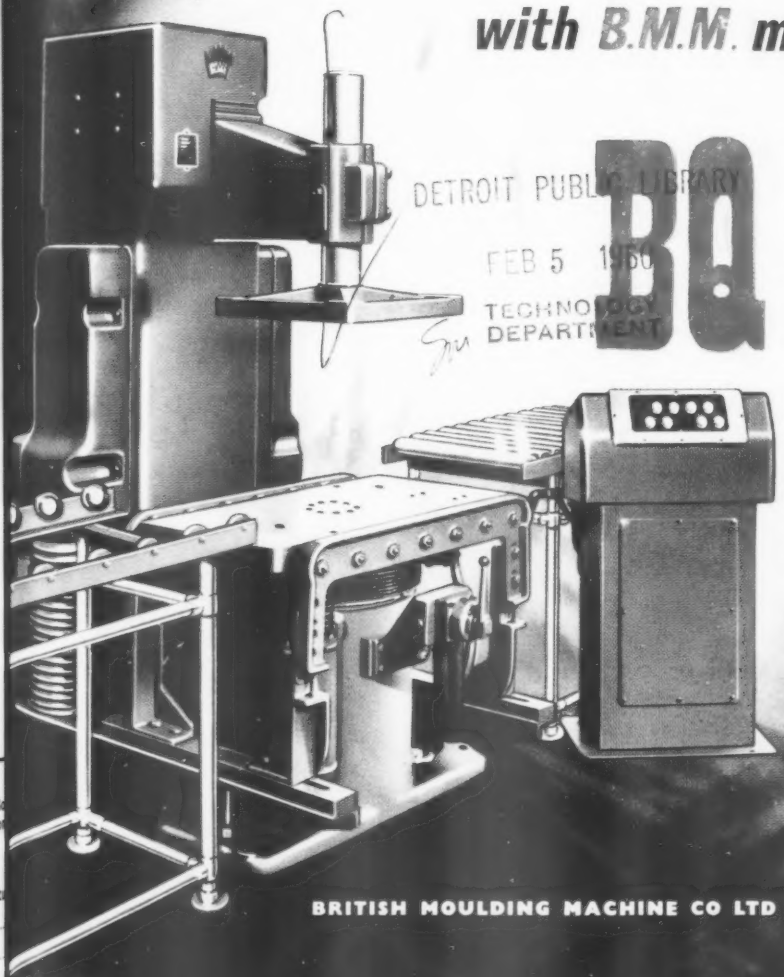
BMM

Automatic Moulding
with B.M.M. machines



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jolt squeeze
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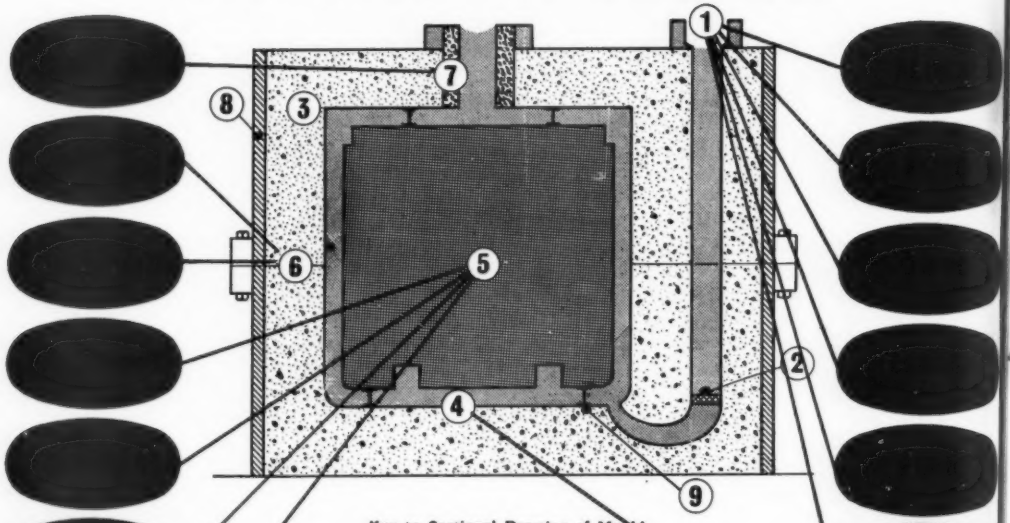

Key to Sectional Drawing of Mould

		Send for booklet No.
1	Metallurgical Control use of Fluxes.	3
2	Clean Metal by using Ceramic Strainer Cores and Discs.	4
3	Coal Dust additional to Facing and Backing Sand.	1
4	Silverskin Blackings, Plumbago and Mould Dressings.	1
5	Cores using Crulin and Crudol Core Binders (Oil Bonded, Air Setting Cereal or CO.2 Binders).	2
6	Moulds Parted with Beecro Silica Free Parting Powder or Beecrol Parting Liquid.	4
7	Casting Feeding with Alsica Exothermic Feeder Heads.	4
8	Moulding Boxes supplied by B.F.U.	5
9	Chaplets, Studs, etc.	5

in check

To check or contain an attack is part of the defensive strategy of both chess and refractories. Of refractories, or furnace linings, one may say they are always at the receiving end. Their job is to resist; to go on checking heat and the action of metals and slags, to ward off chemical erosion and withstand the increasingly severe effects of intensive furnace operations. It's life that counts in refractories. The new high quality products developed by General Refractories bring substantially increased life and new economies for all types of furnaces. Your best opening gambit is to consult the GR Technical Service Department. You will obtain authoritative advice on the correct selection and application of refractories for any specific problem.

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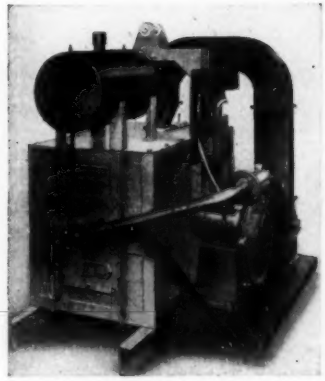
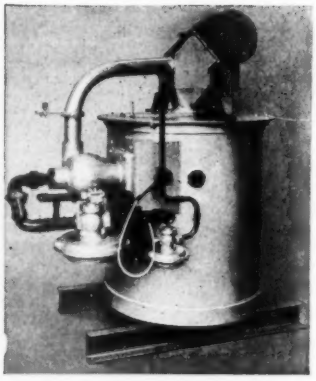


OIL FIRED



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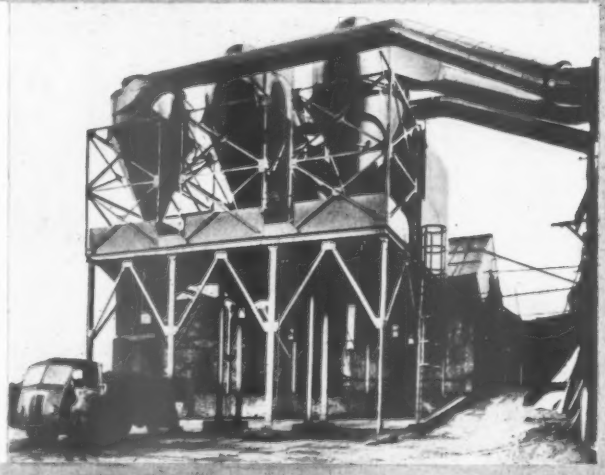

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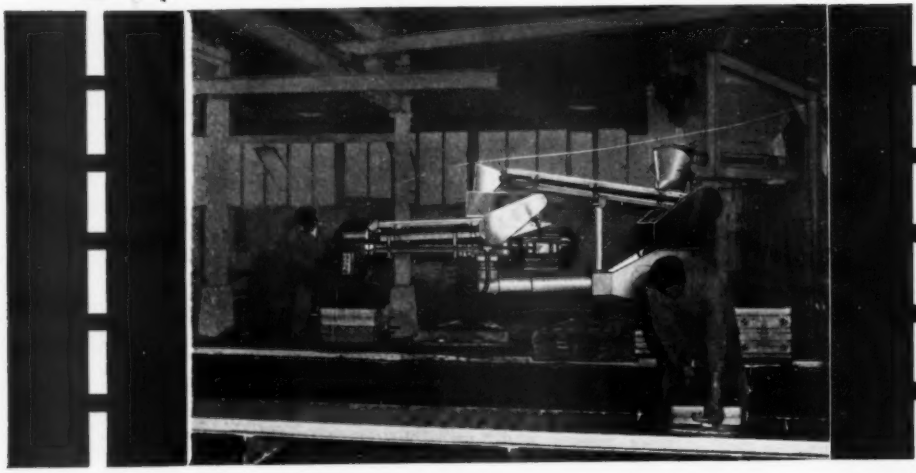

The above photograph, appearing by the kind permission of The Alliance Foundry Co. Ltd., of Luton, Beds., shows one of our Sand Projection Machines No. 6, which has been installed and is now operating in their Foundry.

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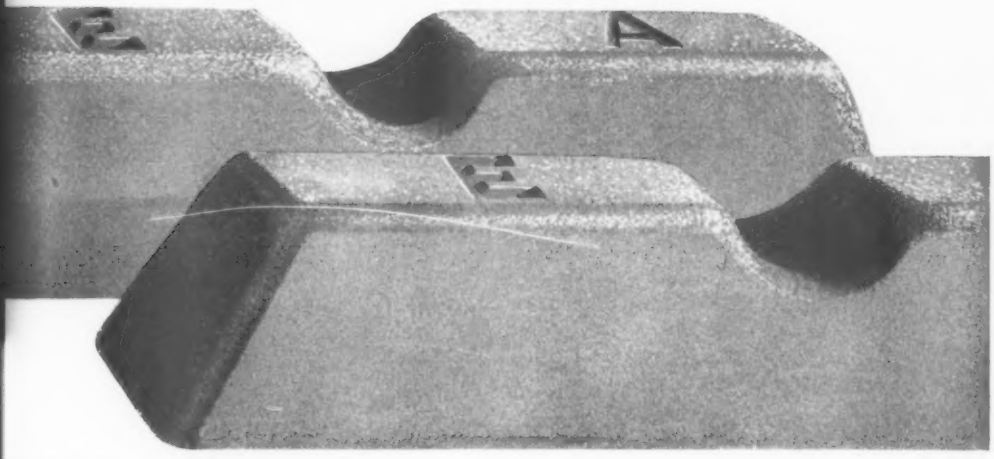

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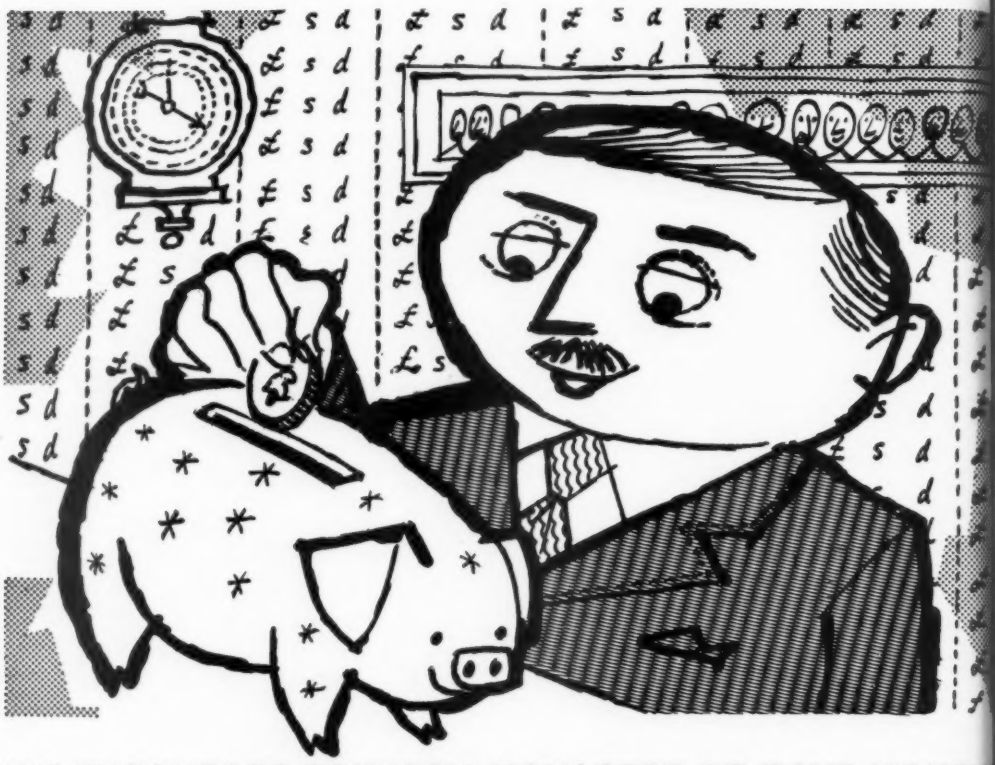

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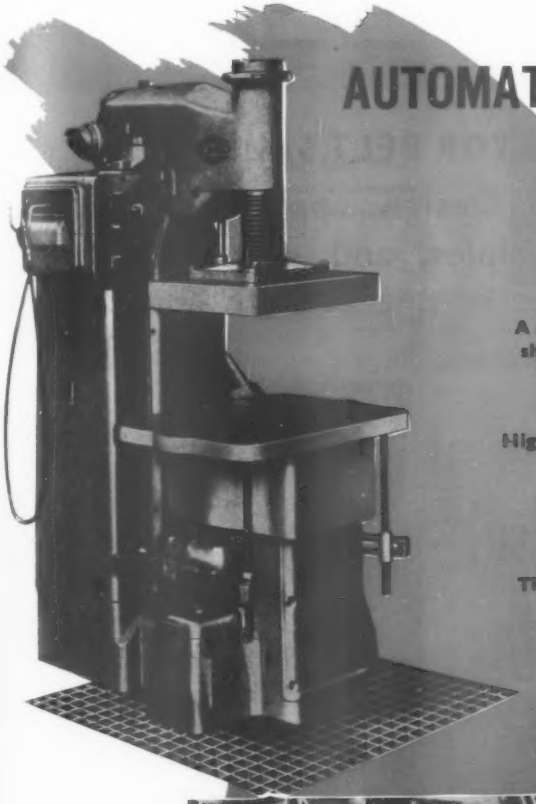

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Moulding Machine,
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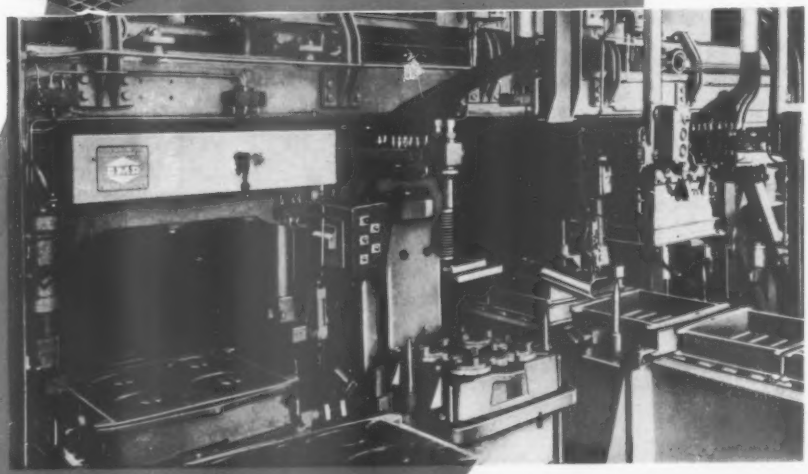

Jolt Squeeze Draw Moulding Machine, Type ARPA, in a fully automatic moulding plant, with sand filling, passover, turnover and assembling device.

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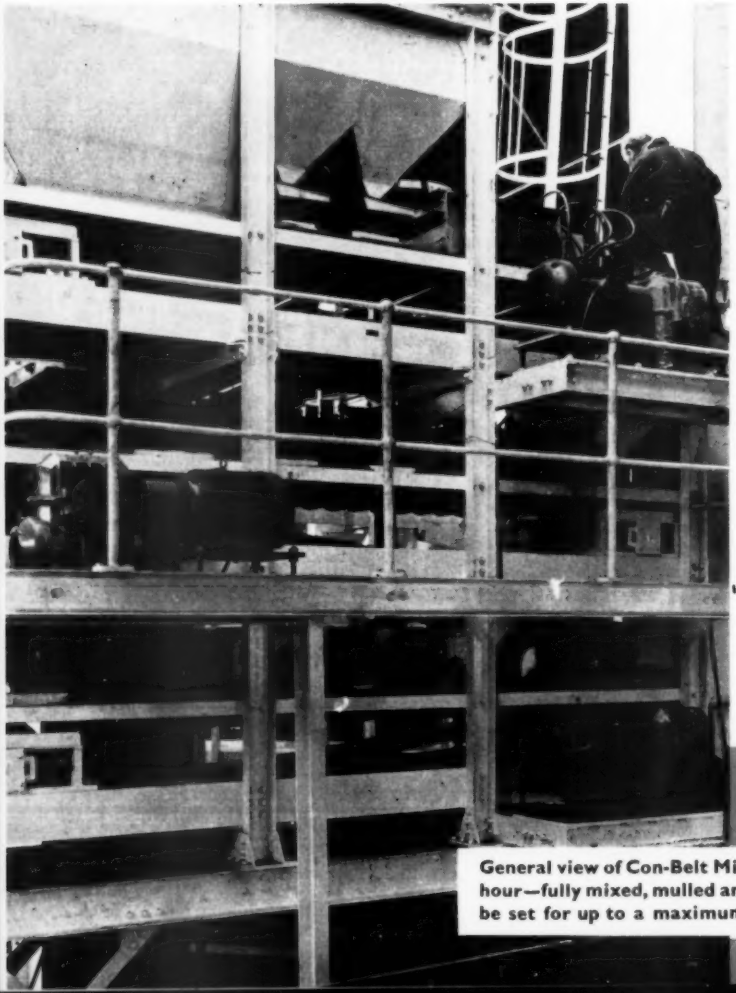

General view of Con-Belt Mill handling 60 tons of sand per hour—fully mixed, mulled and aerated (this same Mill can be set for up to a maximum of 90 t.p.h.)—for grey iron.

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MIXING

MULLING

AERATION

DISINTEGRATION

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Close up of top deck showing bond material and coal dust hoppers with vibratory feeders in front of main feeding and regulating hopper; first Disintegrator Mixer and adjustable air pressurized atomizer for intensive distribution of moisture.

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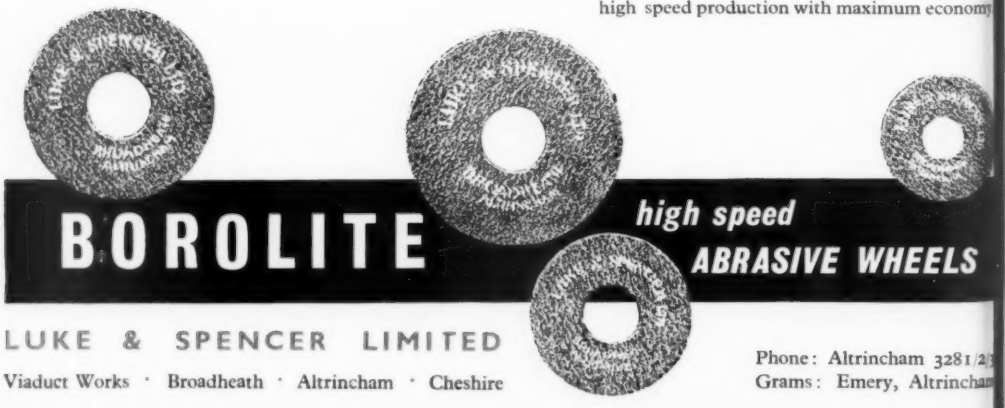

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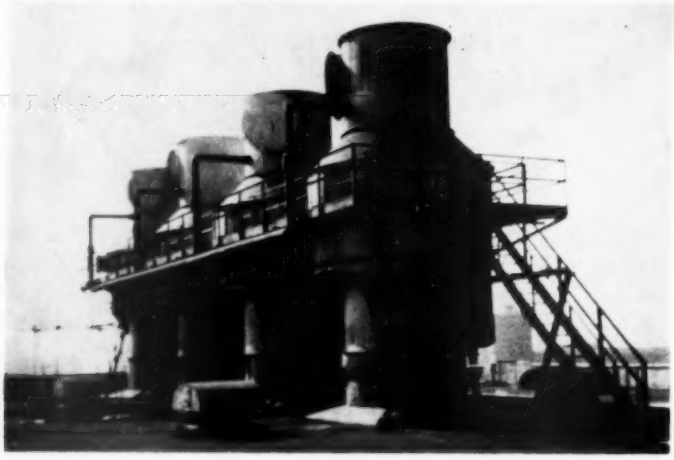

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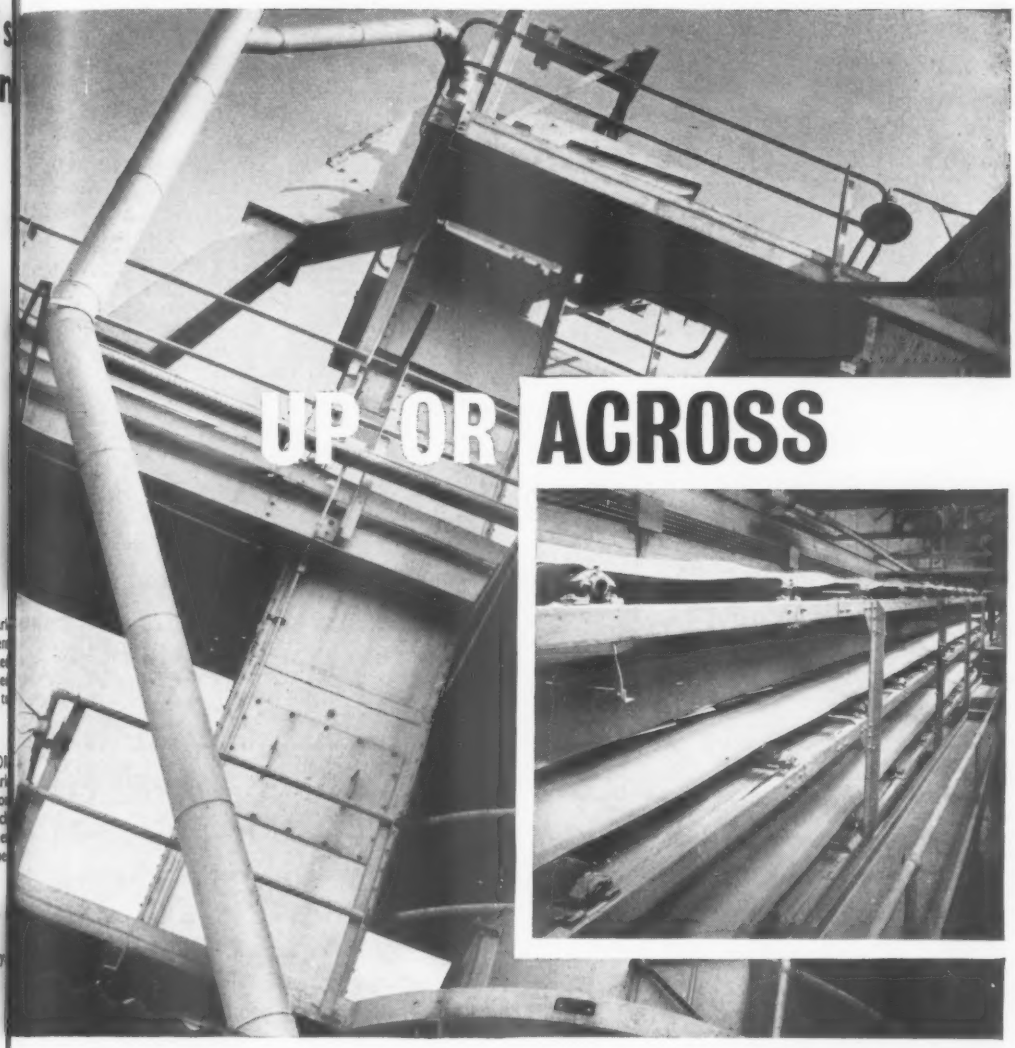

Vertical bucket elevators showing the maintenance platform, and a three tier main cooling conveyor, designed and installed by STOTT'S *for* LEVER BROS. *Port Sunlight Ltd.*

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For Boxes Varying in Size and Shape.

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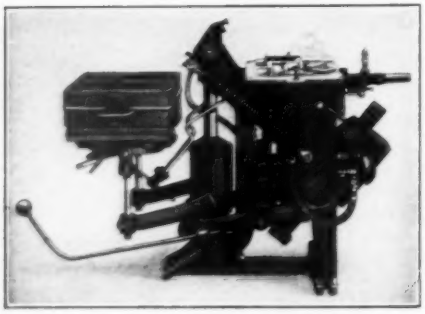

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Load Capacity on Table ... 150 lbs.
Pattern Draw 8". Boxes up to 24" × 16" × 12".

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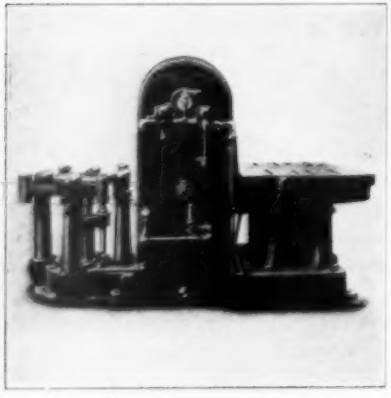

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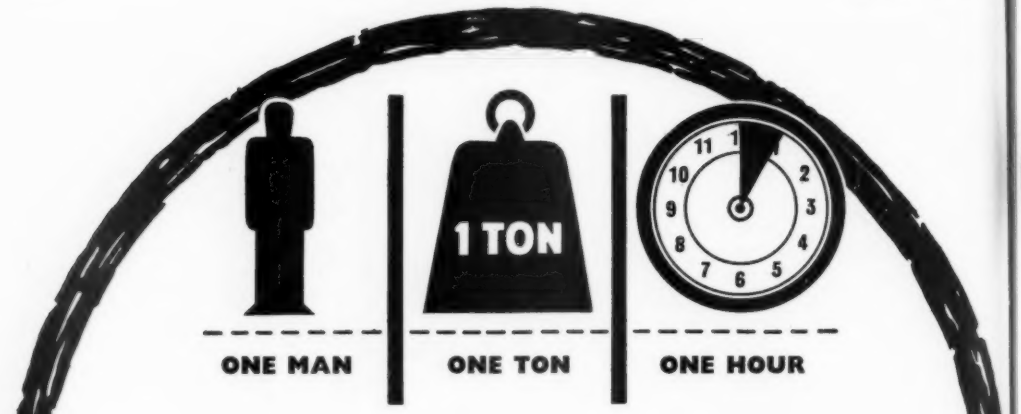

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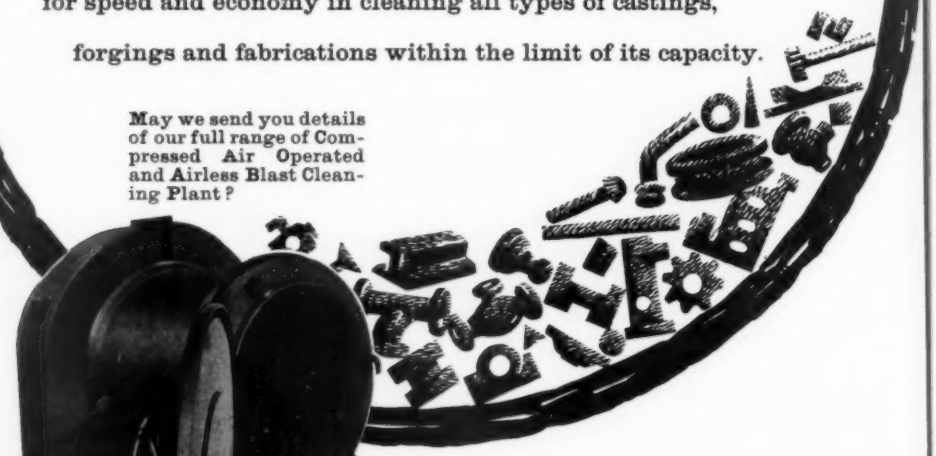

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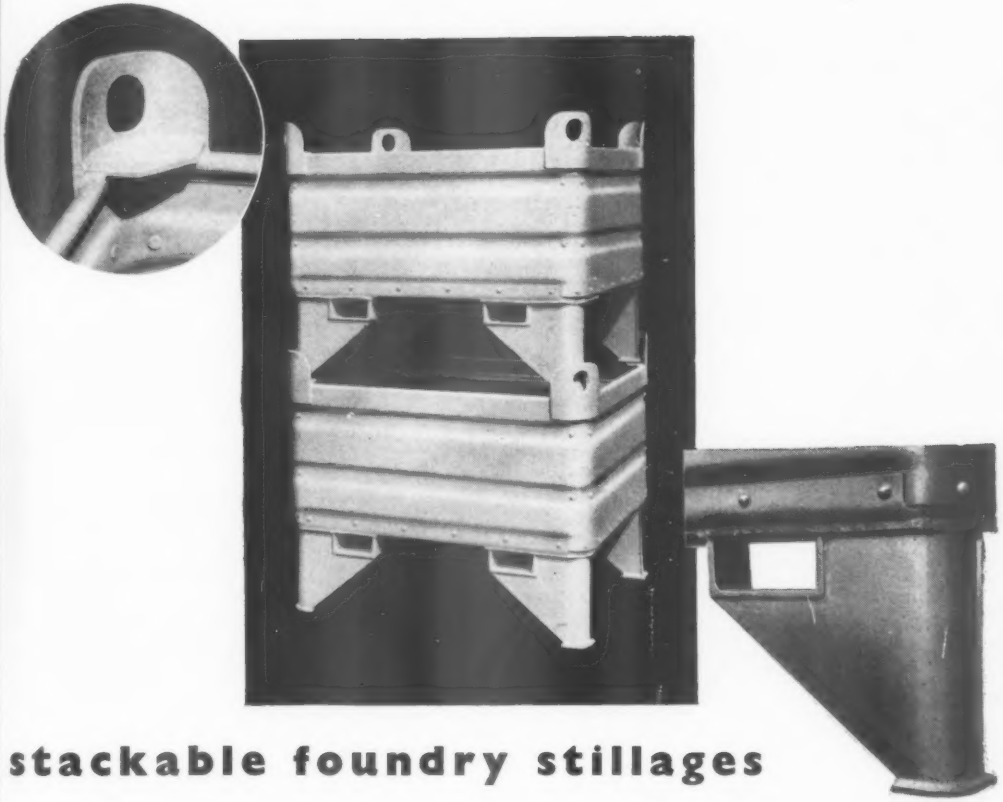

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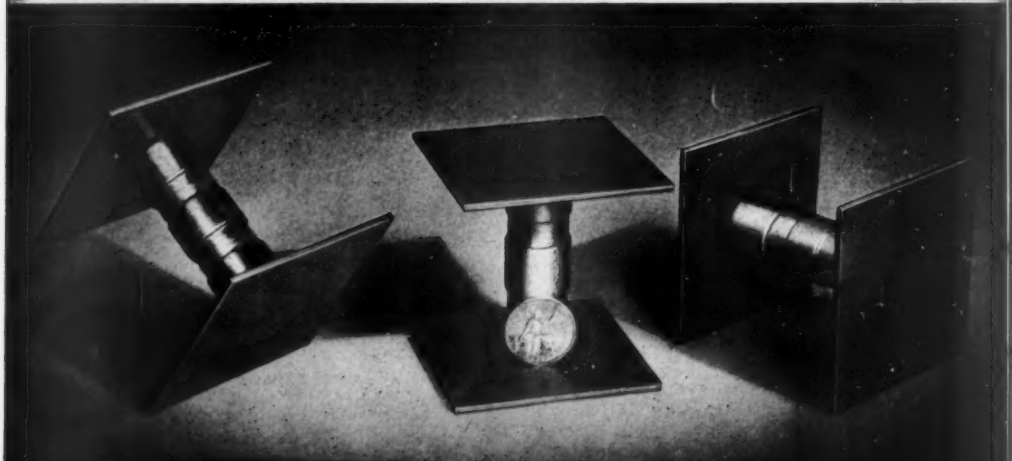

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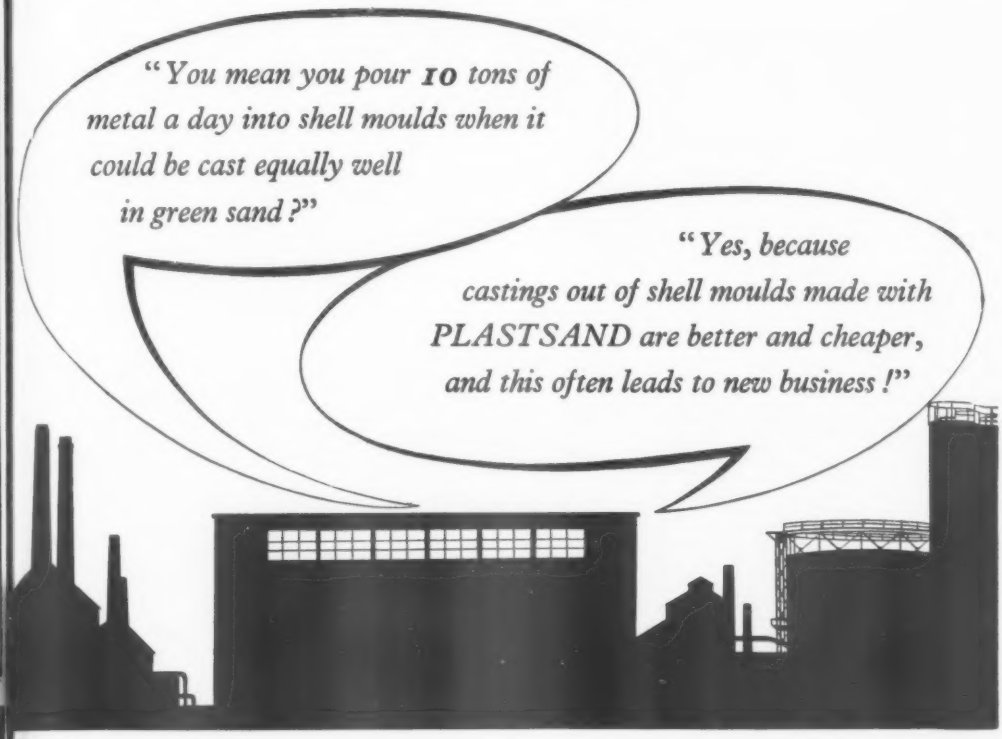
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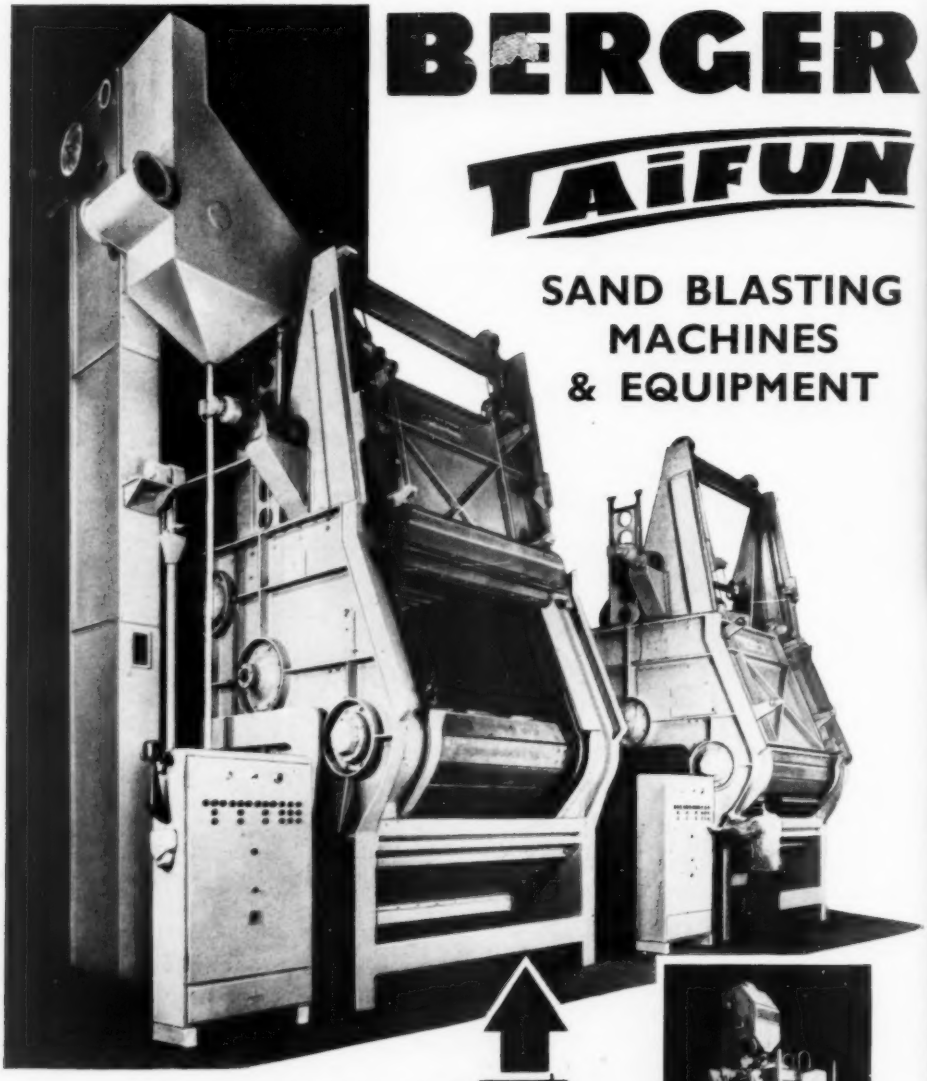

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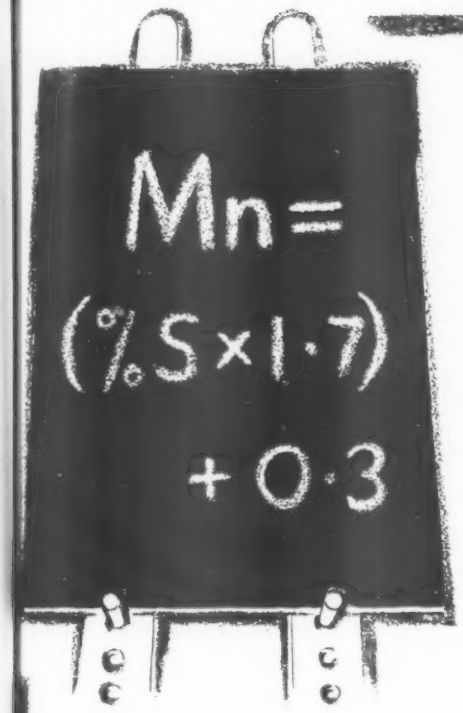

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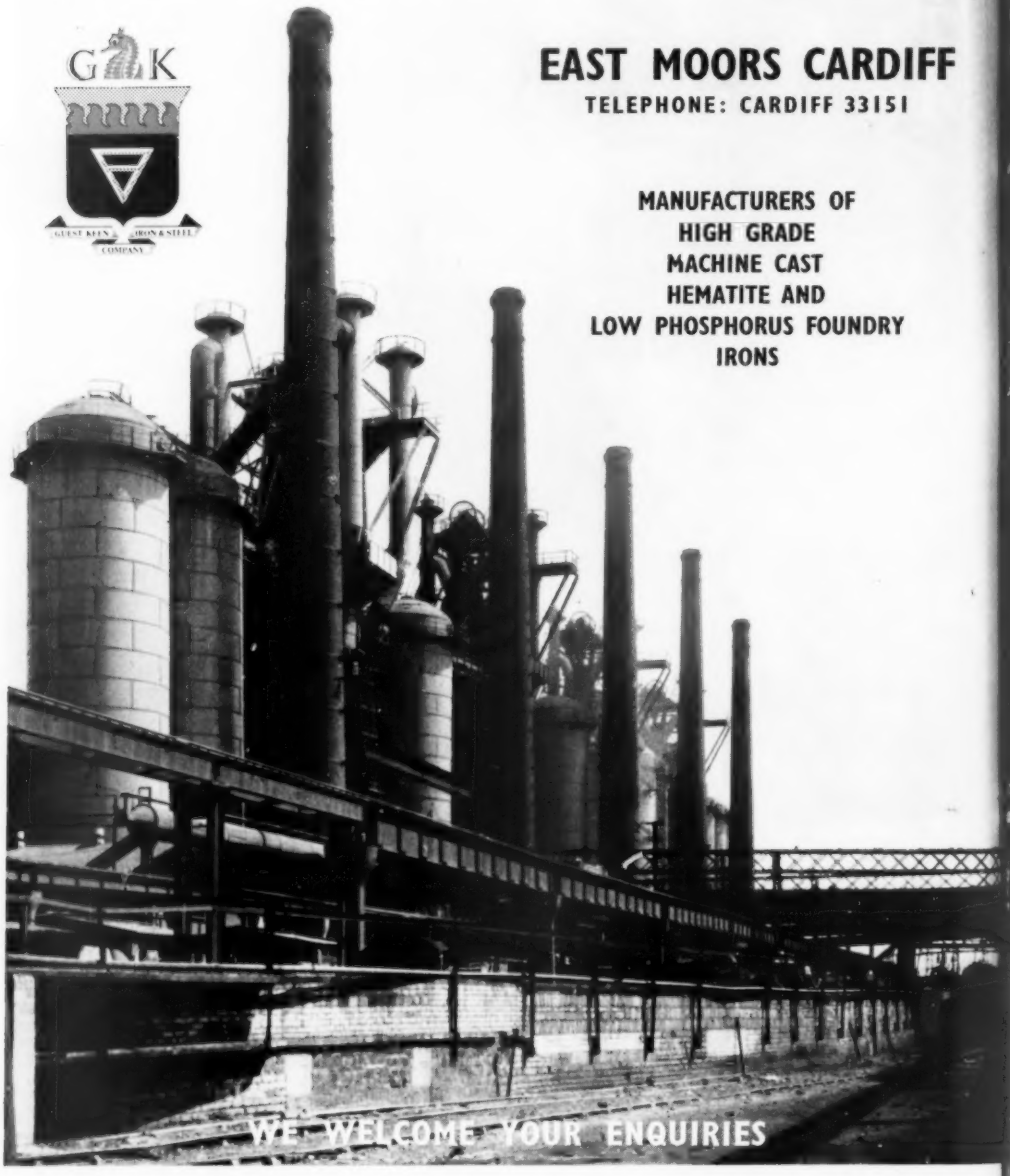

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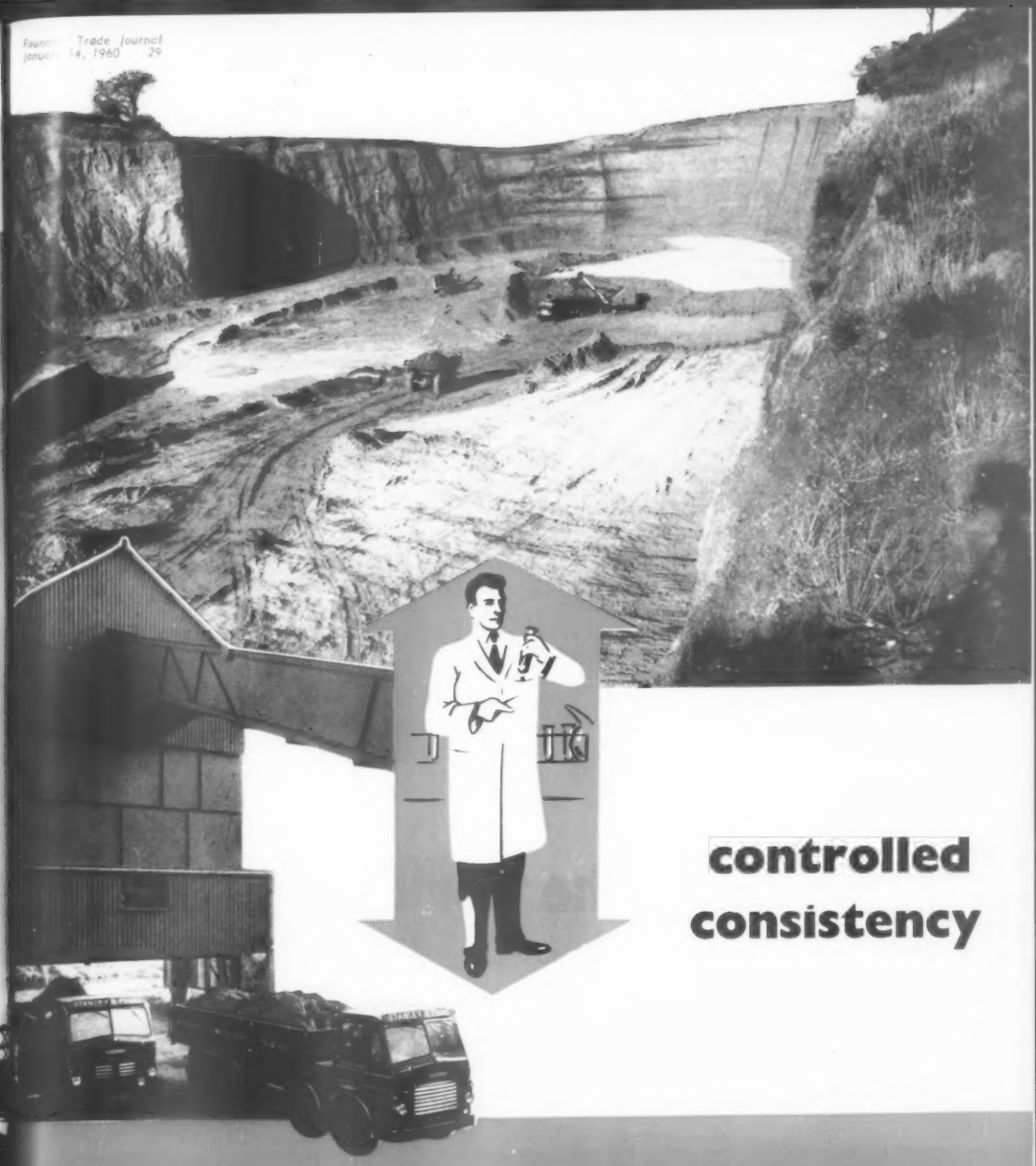

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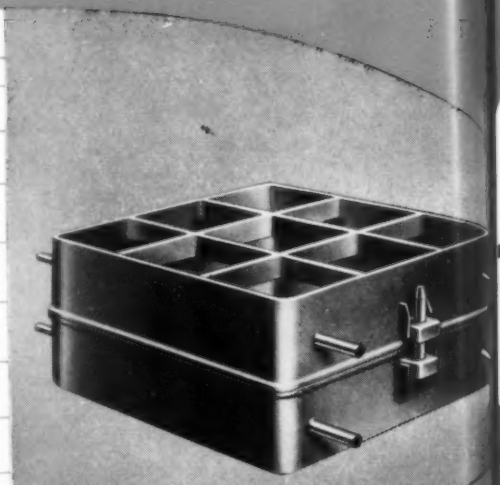

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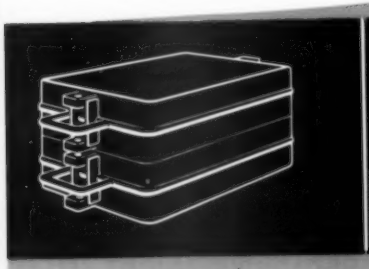

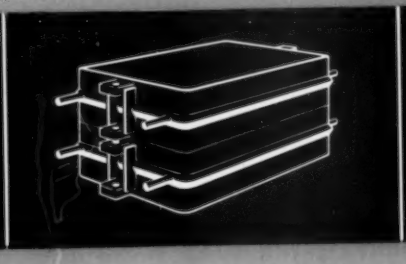

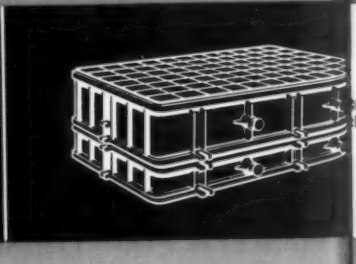

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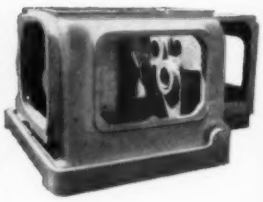

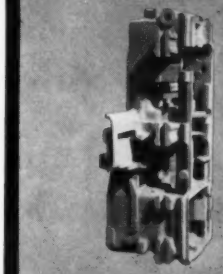

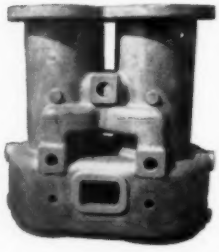

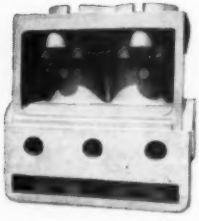

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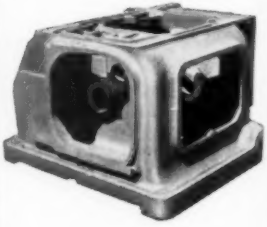

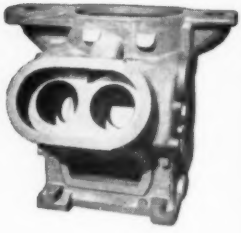

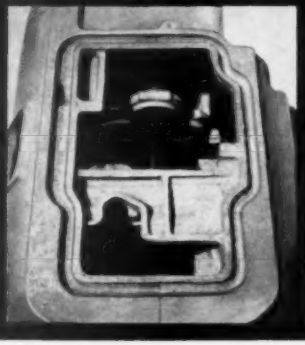

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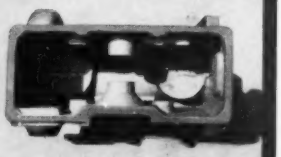

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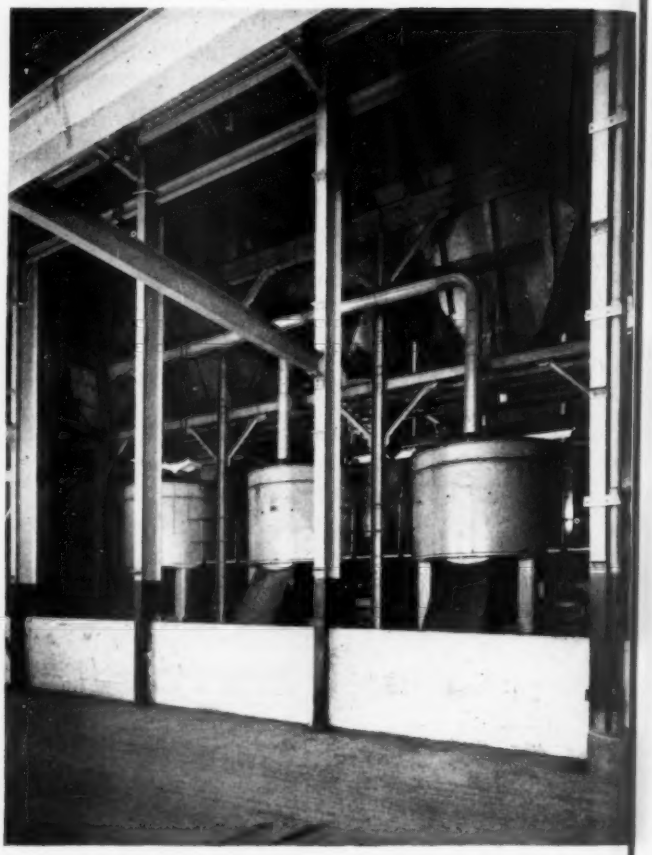

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FOUNDRY
TRADE JOURNAL

Vol. 108 JANUARY 14, 1960 No. 2249

This Age of Instrumentation

Industrial instrumentation could be defined as plant which aids production by providing measurement and thus control. The first instrument to be needed in a foundry was the weighing machine, for ascertaining that the correct amount of material had been delivered from the supplier, and for the proper conduct of furnace practice and other processes and finally for checking castings despatched. Before the general use of the weighing machine, recourse was had to shovelfuls, bucketfuls, barrow-loads and the like, and unfortunately, these obsolete standards are still being used in some of the most backward concerns. Instrumentation then spread to temperature control and the installation of chemical laboratories for the housing and manipulation of a plethora of instruments, soon to include those for sand- and mechanical-testing.

Some elementary instruments have been attached to cupolas for decades, but these are relatively insignificant when compared with those installed by the British Cast Iron Research Association on their experimental plant at Alvechurch. In this context, it is as well to realize that when useful results are forthcoming from such plant they will only be reproducible by those firms which are prepared to instal instrumentation to record periodical or, maybe, continuous performance. The situation to-day is that the capital investment in instrumentation by the largest makers of castings is sufficient to finance a fair-sized foundry. As the size of foundries under consideration becomes smaller, instrumentation becomes progressively less, until it is at a minimum in the little jobbing shops.

For the smaller concerns, the question arises as to what this minimum should be. First, there should be adequate, reliable weighing machines. Then there should be an arrangement made with a testing house for checking samples as an aid to producing consistent cast components, and some simple apparatus for sandtesting—especially checking of moisture content—should be acquired, together with a Brinell hardness-testing machine. For a non-ferrous foundry, a pyrometer is now an essential piece of test equipment. Another essential for this class of foundry is the use as a raw material of ingots bought to specification, and any temptation to use " gypsied-up " scrap should be resisted, as its purchase will only lead to disappointment and possibly the rejection of castings by customers. This is an age of instrumentation, and intelligently used, instruments, if not exactly money-spinners can at the minimum afford a sense of satisfaction that everything is going to plan, or show a " red light " that something needs investigation.

Correspondence

"WASTE" HEAT IN FOUNDRIES

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—In connection with the article under the above title, appearing in the JOURNAL of January 7, page 9, we are pleased to report as follows: In 1958, during the visit of delegates from the International Foundry Congress, we were contemplating using the surplus cupola top-gases from our MBC hot-blast cupola plant for other purposes. This project has now been realized and the excess gas is being used to fire our boilers for the central heating of our buildings.

As may be recalled, the MBC hot-blast cupola uses between 40 to 60 per cent. of its gas to heat the blast for the cupola, the remainder of the gas can be used for other purposes, such as our own application or, again, for firing annealing furnaces, billet-heating furnaces, drying ovens, etc. The MBC cupola gases have a CO content of 20 to 24 per cent. and a calorific value ranging between 650 to 800 Calories per cub. metre (71.5-90.0 BTU per cub. ft.) at N.T.P.; the exact value being dependent on the type of charges and the corresponding coke quality and consumption.

Depending again on the type of application for this surplus gas, the MBC plant is equipped with a high-efficiency gas-cleaner of the venturi scrubber type. Although not absolutely necessary for the working of the plant, this cleaner offers also the advantage of answering atmosphere-pollution problems,—

Yours, etc.,
R. DOAT.

Compagnie Générale des Conduites d'Eau, Liège.

Comment

Referring the above letter to the contributor of the original article brought the following comment:—

In contrast with the figures quoted for CO content of the gases abstracted from the cupola in Belgium, it appears that values of 15 to 20 per cent. CO are commonly obtained in the United Kingdom. These are from furnaces of a similar nature, but only when producing high-quality cast iron, *i.e.*, for the manufacture of cylinder-blocks, etc. In this case, steel scrap is used and a higher coke consumption is also necessary —both factors give rise to higher CO content of the gases exhausted. Under such conditions, of course, regenerators are used for preheating the blast for the tuyeres of the furnace and the overall efficiency of the plant is good.

In one of the cupola installations which were originally being considered, the charge comprises up to 100 per cent. scrap iron with a very low coke consumption and, in consequence, the exhaust gases have a much reduced CO content. Thus, under certain conditions, difficulty is experienced in igniting the gas taken off the cupola and secondary means of ignition must be resorted to.

* * * *

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—In connection with the article in the January 7 issue regarding the possible use of waste heat produced from foundry equipment, the following comments may be of interest to readers:—

To the best of our knowledge, these waste-heat products have not been used in this country, but some experiments have been made in Germany. At the moment, there are comparatively few water-cooled cupolas in this country and therefore such developments as are suggested have not had the necessary encouragement.

With reference to the scheme shown in Fig. 1, the method proposed would not influence either way the efficiency of the cupola. We would estimate that a heat-transfer of some 30 BTU per hr. could be obtained from the cupola mentioned, without pressurizing this system. With reference to the third scheme (Fig. 3—tilting receiver), it is felt there may be difficulties here, such as those resulting from the necessity for tilting the whole unit, the replacement of the lining, etc. As to the second scheme (Fig. 2), it is difficult to comment on this, as we are not conversant with these particular heat-treatment furnaces.

One of the main snags in endeavouring to use waste heat for heating purposes in a foundry is the question of storage. Generally speaking, a foundry requires heating early in the mornings, and particularly Monday mornings, when this waste heat is not available from furnaces, and any system of heating would require some kind of additional primary heat-transfer units.

However, we think there may be some applications in the use of this waste heat, for heating required in ablution blocks, and as hot-blast cupolas do normally run for a reasonably long period, some applications may prove worthwhile for heating certain sections of a foundry. We would be pleased to co-operate on this subject if called upon.

W. H. WHITE,
Development Engineer.

British Cast Iron Research Association,
Alvechurch, Birmingham.

Forthcoming Events

JANUARY 18

Institute of British Foundrymen

East Anglian section: "Production of Foundry Sands," by A. R. Abraham, 7.30 p.m., in the Lecture Hall, Public Library, Ipswich. (Liaison meeting with London branch.)

JANUARY 19

National Society of Master Patternmakers

Works visit to Associated Electrical Industries (Manchester), Limited (formerly Metropolitan-Vickers Electrical Company, Limited). Visit preceded by luncheon, 12 for 12.30 p.m., at the Princes Restaurant, Oxford Street, Manchester; arrival at works, 2 p.m.

Institute of British Foundrymen

Slough section: "Special Copper-base Alloys," by A. R. French and A. W. O. Webb, 7.30 p.m., at the Lecture Theatre, High Duty Alloys.

JANUARY 20

Institute of Vitreous Enamellers

Southern section: "Some Aspects of Pre-enamelling Control and Technique," by A. K. Williams, 7.15 p.m., at the Howard Hotel, Norfolk Street, London, W.C.2.

Institute of British Foundrymen

Bristol and West of England branch: "Use of Vacuum Techniques in the Foundry," by J. I. Ball, 7.30 p.m., at the Royal Hotel, Bristol.

Institution of Production Engineers

Worcester section: "Modern Aspects of Die-casting," by A. E. Fenn, 7.30 p.m., at the Star Hotel, Worcester.

JANUARY 21

Institute of Vitreous Enamellers

Midland section: "Consumer Production by the Vitreous Enamel Development Council," by K. G. Jones, 7.30 p.m., at the Birmingham Exchange and Engineering Centre.

Society of Chemical Industry

Corrosion group: Conversazione, commencing 6.30 p.m., at the Battersea College of Technology, Battersea Park Road, London, S.W.11. Address by Sir Victor Shepheard, 7 p.m.

JANUARY 22

Institute of British Foundrymen

Birmingham branch: Annual banquet and dance, 7 p.m., at the Botanical Gardens, Edgbaston.

(*Continued on page* 62)

Sand Inclusions in Thin-walled Iron Castings, and their Effects on Enamelling*

By P. Göbbels

The first section of this article gives instructions for the economical production of thin-walled iron castings. Then, general comments on cavities in castings, their causes and effects, are followed by an account of the determination of acid content by a heat-extraction process. Finally, investigations carried out on faults in enamelled cast-iron baths are described in detail.

The casting of thin-walled iron castings requires very special care, which must begin with the setting of the mould pattern. The manufacturer of thin-walled castings is not at liberty to select beautiful shapes at will, he must bear in mind any new developments in moulding patterns, so that the required casting can be cast without the possibility of faults developing after the pouring of the metal. Thin-walled castings are particularly prone to variations in wall thickness, but these variations must not be permitted in castings which are intended for enamelling, since they are the cause of hair lines appearing in the enamel after the enamelling process. Lack of care in the construction of patterns can lead to the formation of cracks in castings during cooling. This heat crazing is usually found only after costly work processes have been carried out.

Manufacture of Thin-walled Castings

In the manufacture of these thin-walled castings, the difference between production costs and selling price is indeed very small. Technicians should, therefore, take every care to avoid waste, or at least to keep it to the very minimum. In this respect there must be co-operation between merchant and consumer, so that uneconomical castings are not called for. This, unfortunately, is not always the case. The founder, for his part, can only carry out his difficult task if he first examines the problem and then carefully tests his material and equipment. These tests must begin with his moulding material and continue through the moulding process and the pouring of the metal. Special attention must be given to the molten iron. The scrap metal must be examined in the scrap yard, and must be judged not only by its appearance and by rough analysis, but also by its previous history—the number of times it has been remelted, for instance. The founder must guard against undesirable elements such as chromium or magnesium, which may occur in alloy irons, but which must not be present in thin-walled castings. He must watch the metal temperature and not pour too hot or too cold. If the iron is too hot he can expect a bad cast surface and burnt-on sand as a result. If, on the other hand, the iron is poured too cold, he can expect faults due to rust formation, especially if the piece has been cast in natural sand and left in the sand.

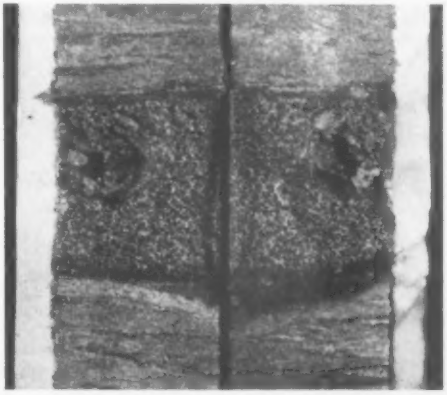
The chemical composition of the iron must be as follows: C 3.5, Si 2.4 to 2.6, Mn and P about 0.6 each and S under 0.1 per cent. This composition, when carefully melted, has given good results, and good-quality castings have been obtained. Of course, immediate steps must be taken to recognize and avoid faults which have their origin in carelessness. This is only possible through knowledge gained by direct experience, during recent years, on faulty castings—this will now be discussed.

Cavities—their Causes and Effects

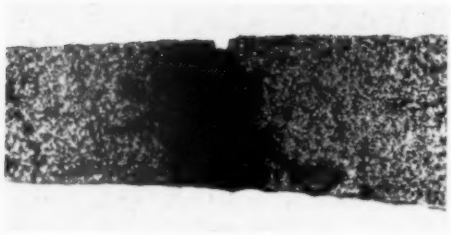
Fig. 1 shows a cavity inside the casting wall. The hole contains sand and moulding material, as well as sucked-in enamel. The piece was listed as an enamelled casting reject. Other castings, unannealed, are shown in Figs. 2 and 3, with the same fault. Here, however, the cavities are dark coloured, obviously from the effect of graphite. Had these castings undergone the annealing process, they would have had a similar appearance to that shown in Fig. 1. Such cavities are often called "pipes," but this is in fact a wrong description—the cause of their appearance should be sought in the sand and other moulding material at the time of construction of the mould.

The faulty castings shown in Figs. 2 and 3 come from a foundry which manufactures thin-walled

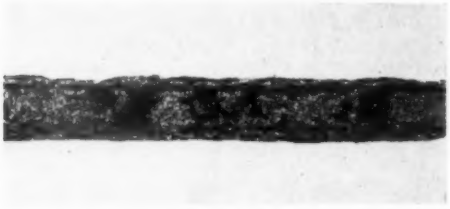
FIG. 1.—*Cavities inside the wall of an iron casting, with sand and bentonite inclusions.*



* Originally translated from *Mitteillingen* and published by the Institute of Vitreous Enamellers—reproduced by permission.



FIGS. 2 *and* 3.—*Similar cavities to those shown in Fig.* 1, *but dark-coloured because the castings were not annealed.*



castings by the Croning process. High scrap figures led to a very careful investigation of faults which appeared after water-pressure tests. In this case, a number of faulty places which let in water were cut into on both sides of the mould to a depth of a few mm., and the uncut parts knocked away. By this method of examination the cavities were exposed. The same defect was found on all the test-pieces which let water through. By observation with binoculars the glazed spots were recognizable, and could be easily removed with a steel needle. The spots from the dark coloured cavities were grains of sand, but were not immediately recognized as such, as they were intermingled with graphite which had to be cleaned away. After rubbing with the fingers to get rid of the carbon, the quartz grains were identified.

Mould Sand mingles with the Iron

The existence of these cavities can be attributed to the reaction of the fusing sand of the mould mingling with the cast iron. Gas-forming material is present in fair amounts in the intermingling sand—whether this will form blisters after solidification depends on the speed of the freezing of the surrounding metal. This gas causes the cavities, which, in general, vary in amount according to the quantity of gas in contact with the surface of the casting. In these gases there is always a considerable amount of carbon monoxide, which decomposes during the cooling process. The consequent carbon deposit, as well as the graphite, intermingles with the sand grains and stains the cavities and their surroundings—and indeed any other place where gas may be found, such as the gas exit, which is therefore not metallically sealed. This is, of course, a very serious matter.

FIG. 4.—*Section view of sand inclusions.*

In such defective spots the silicon content, on account of the sand inclusion, is higher than the average content. Examination of both a fault-free and a faulty piece showed that the sound material had a silicon content of 2.45 per cent., whereas that of the faulty material was 3.21 per cent. Since silicon in iron has hardly any tendency to segregate, one can assume that in both examples the silicon content of the metallic parts was equal. In a subsequent examination by microscope, both test-pieces showed sand grains in the faulty places.

Heat-extraction Process

In a further demonstration the acid content was determined by means of the heat-extraction process. Three samples were taken from a casting: one of sound metal, one with faulty places which was thoroughly cleansed of all visible adhesions, and one ordinary sample with faulty places—the casting skin being removed from this third sample. These test specimens were carefully ground before the extraction process, which was carried out at 1,600 deg. C. The results shown in Table 1 were obtained.

TABLE 1.—*Results of Tests by the Heat-extraction Process.*

Test specimen.	Total gas (ml. per 100 gm. by weight).	O_2 (per cent.).	H_2 (per cent.).
Without defects .. .	6.94	0.003	0.0002
Cleaned specimen with defects	21.44	0.010	0.0005
Ordinary specimen with defects	12,990.00	7.28	0.163

From the values ascertained, it can be seen that the sound casting showed very little acid content, as is usual with a good-quality iron casting. The cleaned faulty casting showed a quite considerable acid content—one can conclude from this that the faulty place embraced a much larger area than could actually be seen. The faulty specimen which had not been cleaned gave an acid content which is far too high for a good casting. It must be noted here, however, that the total amount of gas could not be accurately measured, on account of the violent reaction which occurred immediately after the specimens fell into the heated crucible—certainly, a part of the test could not be accurately valued, since the splashes did not fall back completely into the crucible. The specimen had not merely been shotblasted, but also immersed in

water. As the casting from which the specimen was taken had been subjected to water impregnation, there must have been water remaining in the specimen. The very high gas content could therefore be partly attributed to the water in the faulty place.

In grinding a specimen, it is seldom possible to obtain a cross-section of a grain of sand, because the loose grains in the specimen break away. However, after several attempts the author succeeded in obtaining such a view, and this is shown in Fig. 4.

Tests on Cast-iron Baths

To a certain extent, the above observations can be applied to faults which occur in the enamelling of cast-iron baths. In the example shown in Fig. 5, the exterior of the sides of a bath showed dark specks shortly after applying the groundcoat (such drawn-in pores often appear after the final enamelling of bath tubs). An experiment was carried out, similar to the one already described, on a reject bath on which specks had been noticed after applying the groundcoat—these having disappeared, however, after the ground coat had dried out.

Specimens were taken by cutting-in to a depth of about 3 mm. on both sides, the remaining parts being knocked or broken away. Fig. 6 illustrates these faults, and shows that in every case the cavities are surrounded by dark-coloured patches similar to those shown in Figs. 1, 2 and 3. In order to confirm the hypothesis that the dark spots (Fig. 5) in the undried ground coat must be attributed to water which had been forced into these places, the following experiment was carried out. A sample was taken from a cast-iron bath which showed these dark spots, and ground smooth on both sides. In order to test whether water could be forced into the casting, a vacuum-sealed rubber ring was attached (Fig. 7). Upon this rubber ring a glass cloche was sealed and connected with a vacuum pump (Fig. 8). The test plate and a part of the glass cloche were placed in a dark-coloured liquid, and the cloche exhausted of air. And after a few seconds the liquid had penetrated the cast plate as shown by the dark spots in Fig. 9. These are similar to the dark spots which appear on the ground coat. This experiment shows that the defects are open to both sides, and confirms that water from the ground-enamel "slip" can force itself through and into the metal. Thus, the dark spots in Fig. 5 are simply places where water has penetrated through to the metal.

Causes of the Dark Spots

This fault is due chiefly to the fact that the exterior of bath sides is only lightly sprayed with groundcoat, in order to obtain a bright white surface. This thin coating dries quickly, and water on the inside slowly moistens the metal in a continuous action, gradually making its appearance on the surface of the coating in dark spots. Sand was also found in the cavities, so obviously the faulty places in the bath tubes are similar to those which have already been discussed. They are thus to be attributed to inclusions of sand and other moulding materials, which must be regarded as foreign matter as far as cast iron is concerned,

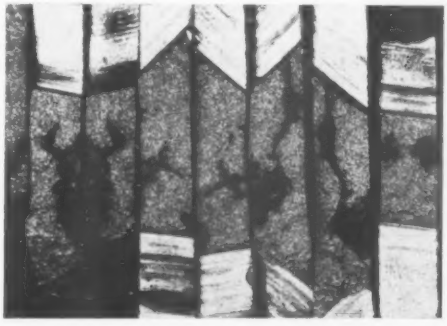
FIG. 5.—*Dark specks which appeared on the side of a bath shortly after the groundcoat had been applied to it.*

since they react with the molten iron during the formation of gas, leaving behind cavities in the finished casting and in many cases penetrating through to both sides. If the cavities are open only to the enamel side, the result is a faulty enamelled surface due to "pores" or "blow-holes." If the cavities are open to both sides the casting must be regarded as a reject.

Necessary Precautions

During the casting process the moulding material is obviously eroded by the flowing metal and crumbles away, in some cases becoming engulfed by the molten stream and then fixed permanently

FIG. 6.—*Sections through the faults shown in Fig. 5.*



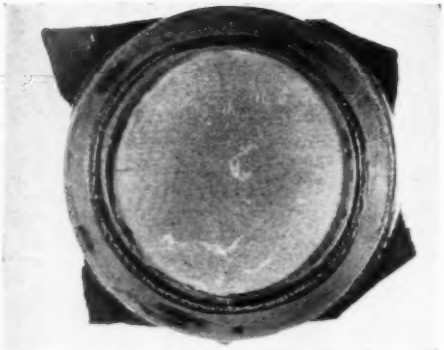


FIG. 7.—*Rubber ring attached to a faulty section from the bath shown in Fig. 5, in preparation for testing to find out whether water could be forced through the casting at this point.*

in the metal. During this time, and also during the cooling period, such moulding material reacts with the molten iron at these spots whilst gas is being formed. These faults can be avoided by a suitable choice of moulding material. Above all, care must be taken to ensure that: (*a*) the mould is well rammed, (*b*) the surface is firm, with no projections,

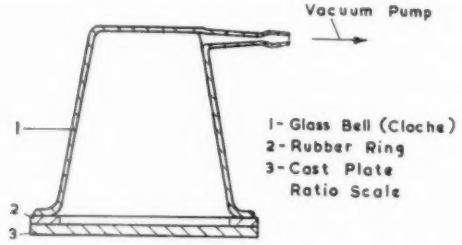


FIG. 8.—*Arrangement of the water-penetration test apparatus.*

and (*c*) the moisture content of the material is not too high. High moisture content in the mould leads to light, local gas-formation during melting, and this may force fragments into the metal. High gas permeability of the sand, and good ramming of the mould, are essential.

In casting by the Croning process, the surface was sealed by spraying with a solution of water-glass, and dried before pouring the metal. By adopting these methods scrap percentages were considerably reduced.

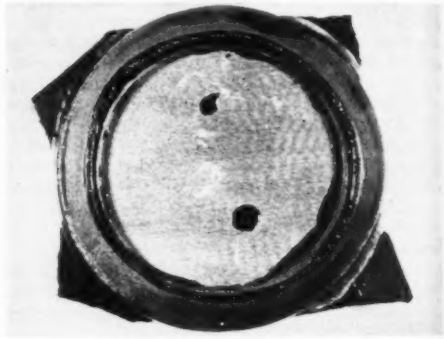


FIG. 9.—*The same casting section as that shown in Fig. 7, after testing for water penetration (note the two dark spots).*

Conclusion

Cavities in thin-walled castings may be caused by the moulding material, especially by quartz sand. The cavities occur through reaction between the molten iron and the moulding material causing the formation of gas. Carbon from the gas and metal is deposited in, and stains, the cavities and surrounding area. The annealing process can remove the staining, but not the porosity. The presence in castings of sand and moulding-material inclusions can nearly always be proved by chemical and physical experiment.

Esso plans 75-Mile Pipeline

Planning permission to lay a 75-mile oil products pipeline from its refinery at Fawley, near Southampton, to a new distribution depot, having a storage capacity of 20,000,000 gallons, near London Airport, is being sought by the Esso Petroleum Company, Limited. The total project will cost, it is estimated, £2,500,000.

The proposed route of the pipeline, which will be buried to a depth of at least 3 ft. over the whole distance, will carry it under Southampton Water and under the Thames. It will also pass under several railways, major highways, paved roads, rivers, and canals. The pipeline will be all welded and specially protected against corrosion, and it will have an initial capacity of £1,500,000 gallons a day. It is hoped to commence work this year; completion is planned by the early part of 1963.

This will be the first large-scale commercial pipeline for refined products to be laid in Britain.

Industrial Output still rising

The rise in Britain's industrial production continues. Towards the end of 1959 it was running at between 9 and 10 per cent. above the level of a year previous. The provisional index of industrial output for November is 116-117 (seasonally adjusted), compared with 116 for October and 107 for November, 1958. On this basis output in October and November combined was some 2 or 3 per cent. higher than in the third quarter.

Industrial revival is now seen on a much broader base than earlier in the year when it was limited for the most part to motor-car manufacturers and makers of domestic goods. An important contribution is now being made by steel, the mills in November working up to 95 per cent. of capacity. Heavier industries still have some way to go to reach the level of steel demand achieved in other sections. The lengthening of the order-books of manufacturers of machine tools which began last summer seems to be steadily maintained.

Producing Sound Castings in Al/7-per cent. Mg Alloy

(Abridged)

*By W. H. Johnson and J. G. Kura**

The maximum distance that the solidification shrinkage in ferrous castings can be fed has been determined and, as a result, formulæ for correct dimensioning of the feeder-heads† have been evolved. Similar research on the feeding of non-ferrous alloys has been until now quite limited. The Al/7-per cent. Mg alloy was selected as representative of a typical light non-ferrous alloy. It was suited to the investigation because it is known to produce gross shrinkage when inadequately fed.

The effects of the following variables on thermal gradients in castings during solidification were investigated by the authors: Feeder-head position; single and multiple gates; chill location, and gate location. Cooling curves were obtained from thermocouples placed at strategic locations in a solidifying casting, and established the complete history of movement of the "freezing front." As a result of these investigations it was discovered that the correct feeder-head dimension in any given instance is readily obtained by the use of a simple formula (the shape factor):

$$\frac{L + W}{T}$$

where L = length of casting (in.), W = width of casting (in.) and T = thickness of casting (in.). The empirical relationship between the shape factor and the ratio of feeder-head volume to casting volume (R_v/C_v) for low-carbon steel is shown by the dotted area in Fig. 1. Trend lines for various s.-g. irons, and for some highly-alloyed steels, are also shown. Castings with shape factors and R_v/C_v ratios above the trend lines in the diagram would be sound—for example, to make a good casting from s.-g. iron with a carbon equivalent of 3.66, the minimum R_v/C_v ratio would be 1 for a shape factor of 8.

Ferrous Alloy Castings

The data contained in Fig. 1 are based upon the fact that the feeding range of feeder-heads used with ferrous alloys has been found to be $4\frac{1}{2}$T for plates, and $6\sqrt{T}$ for bars, where T is the thickness in in. The size of the feeder-head was selected as if it were intended to feed steel plates $\frac{1}{2}$, 1, or 2 in. thick, with a length and width of 5T. In the course of the investigations, the length of the Al/7 per cent. alloy plates was varied to determine the actual feeding range of the feeder-head. Three thicknesses were used, three different lengths being studied. Two thicknesses of bar were used, with a length of 4T. The diameter of the feeder-head used with the plates was $2\frac{1}{2}$T—for the cubes and bars, the diameter was $1\frac{1}{2}$T. The height of the feeder-head when placed on the top of the casting was 5 in. When used as a side-feeder, the feeder-head height was equal to the thickness of the casting plus 5 in. The plates, cubes and bars were cast horizontally.

From the data obtained from the embedded thermocouples, curves were constructed of temperature *versus* distance from the feeder-head, at specific time periods after the castings were poured. From these graphs, the longitudinal and lateral thermal gradients were determined for the castings at their centre line. The thermal gradients were determined at the solidus temperature. The plates

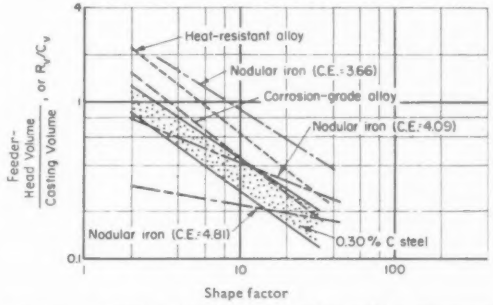


FIG. 1.—*Graph showing the relationship between shape factors and R_v/C_v ratios of various alloys.*

were made 1 in. thick, 5 in. wide, and 3, 5, or 8 in. long. They had a 6-in. feeder-head of $2\frac{1}{2}$-in. dia., a side-feeder, and were cast horizontally as illustrated in Fig. 2.

Shrinkage voids were not detected in the two shortest plates (3 and 5 in.). The lowest thermal gradients in these two plates were 5 F. deg. per in. Shrinkage voids were present in the longest plate (8 in.). The data showed that the limit of the feeding range of the feeder-head for a 1-in. thick plate is about 5 in., or 5T. The limit of the feeding range of the feeder-head for a 2-in. thick plate is 6 in., or 3T. It was concluded that the feeding range of a feeder-head decreases as the

* Mr. Johnson is senior metallurgist, and Mr. Kura is division chief, at Battelle Memorial Institute, Columbus, Ohio, and the Research Committee of Light Metals Division, AFS. The authors presented the full version of their Paper at the 1959 AFS Convention.

† In the original Paper, the American term "riser" was used by the authors.

Producing Sound Castings in Al/7-per cent. Mg Alloy

section thickness of its plate increases. It is apparent that feeding of aluminium-alloy plate castings as a function of thickness does not follow the general rule for steel castings.

Thermal Gradients *versus* Shrinkage

Although the thermal gradients in the centre of 1-in. plates were larger than in the 2-in. plates, the thermal gradients fell to zero in front of the feeder-head. When these gradients are non-existent or small, as in the 2-in. thick plates, feeding is difficult. Increasing the ratio of feeder-head volume to casting volume does not help. The effect of changing the location of the feeder-head was investigated for the 1- and 2-in. thick plates with top-feeder and one gate. As illustrated in Fig. 3 (Plate A), the feeder-head was located at the geometric centre of the plate. The data from the three plates showed:

(1) No shrinkage in the two short plates (3 in. and 5 in.);
(2) the 8-in. long plate was not sound;
(3) thermal gradients at the extremities of plates were high because of edge effects, but decreased beneath the feeder-head, and
(4) the thermal gradients under the feeder-head of the 8-in. long plate dropped below 5 F. deg. per in.

When a top-feeder was moved from the end to the centre of the 1-in. thick plate, a different pattern of thermal gradients was produced. In the plate gated and fed at one edge, the thermal gradients were high at the edge opposite the feeder-head, but were at a minimum immediately in front of the feeder-head. The experiments with the 1- and 2-in. thick plates showed that the effectiveness of a top-feeder decreases as the section thickness increases. Also, in 2-in. thick plates, a top-feeder has a shorter feeding range than a side-feeder. Increasing the number of gates to 2 or 4 per plate was investigated for plates measuring 1 by 5 by 8 in., and 2 by 6 by 10 in. These sizes were chosen because, with a top-feeder, they were not radiographically sound when a single gate was attached to one edge. The multi-gating systems are illustrated in Fig. 3. Multiple gates increase soundness because localized hot-spots are avoided. As a result, micro-porosity is more uniformly dispersed throughout the casting.

Insulated Top-feeder

The incorporation of an insulating sleeve merely increased the time of solidification of the metal in a top-feeder, the thermal gradients in the vicinity of the feeder-head remaining below the minimum required to obtain maximum soundness. No increase in feeding range was detected. A smaller insulated feeder-head was beneficial, because more of the cope surface of the plate was chilled by the mould wall. However, the thermal gradients beneath the feeder-head were below those required for soundness. It must be concluded, therefore, that an insulating sleeve by itself does not increase the feeding range of a feeder-head.

Effect of Chill Location

The effect of steel chills placed along the edge of an Al/7-per cent. Mg alloy plate opposite the feeder-head was selected for the initial investiga-

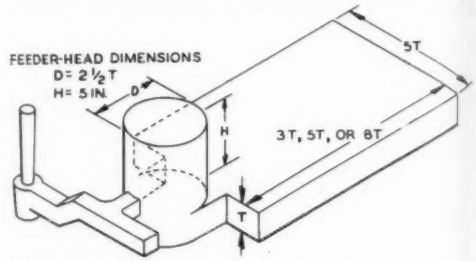


FIG. 2.—*Diagram showing the location of the gate and side-feeder on the cast plates used in the experiments.*

tions on location of chills. It was found that shrinkage voids occurred in the 1-in. thick plate (8 in. long), and in the two 2-in. thick plates (10 and 16 in. long). Although the thermal gradients near the chilled end of these plates were as large as 100 F. deg. per in., in both thicknesses the gradients decreased to less than 5 F. deg. per in., so that feeding from the feeder-head in the last stage of solidification was difficult, and shrinkage voids developed. These studies show that end chills exert a potent but short-range influence on the rate of solidification.

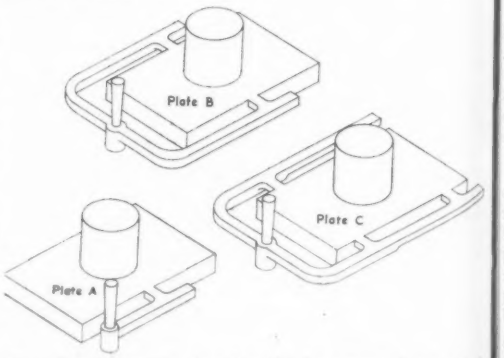


FIG. 3.—*Diagram showing the location of the single and multiple gates on the cast plates which were fed by a top-feeder.*

End Chills

Two additional 2-in. thick plates were cast to determine whether directional solidification of the desired degree could be obtained with steel chills in locations other than at the far edge of the plate. The chills were placed at the centre, one along the edge opposite the feeder-head, and the other in contact with the drag surface across the width of the plate at the centre. The immediate demand for feed metal by both the end and bottom chills caused

gross shrinkage voids to form in the top half of the castings almost directly above the centre chill. It must be concluded, therefore, that centre chills of the type described here are ineffective in promoting soundness. The inability of the end chill to maintain a continuous high rate of heat removal has been attributed to the formation of an air gap between it and the casting. An air gap did develop, approximately 8 min. after pouring, when the chill was not deliberately secured to the casting. Thermal gradients at the solidus temperature in plate A were essentially the same as those in plate B, which had no gap between the casting and the chill. A greater rate of cooling below the solidus temperature was obtained.

Wedge-shaped Chills

Several 1- and 2-in. thick plates were also made with wedge-shaped chills. These chills were located in the drag and were positioned parallel with each other. Their wide end was set at the edge of the plate opposite the end feeder-head. It was discovered that wedge-shaped chills which extended

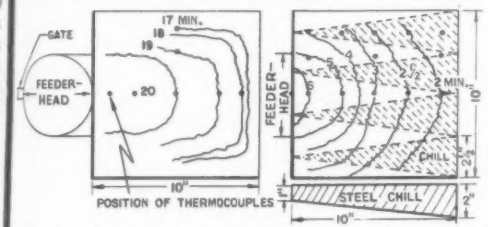


FIG. 4.—*Comparison of thermal gradients and soundness obtained in 2-in. thick plates measuring 10 by 10 in. The progression of end-of-freeze isotherms is shown, (left) when no chills are used, and (right) when wedge chills are placed along the length of the plate.*

close to the feeder-head markedly improved the soundness in the plate. The wedge-shaped chills had a taper both in width and in thickness, and produced thermal gradients large enough to ensure soundness. The results of these experiments proved that plates measuring 1 by 5 by 8 in. can be cast sound by using wedge chills designed to give an impetus to the thermal gradients. The effectiveness of the wedge-shaped chill in producing soundness can be seen by comparing the thermal gradients present in an unchilled, and chilled, plate (see Fig. 4). These experiments proved that the large thermal gradients and progressive directional solidification required to produce sound castings up to 2 in. thick can be obtained by using wedge-shaped chills with a double taper.

Tensile Properties

The soundness of the plates cast from the Al/7-per cent. Mg alloy was determined by radiographic examination. It was thought that the acceptability of these plates, and the methods used to achieve soundness, should be reflected by the tensile properties of the plates. Therefore, plates were cast to determine whether an improvement in tensile properties occurs when wedge chills are used to extend the feeding range of a feeder-head. It was then discovered that the average tensile strength and elongation obtained in the plates cast with wedge chills equalled or exceeded the minimum tensile properties obtained in separately-cast test-bars. These high properties of the chilled castings were attributed to the fine-grain structure produced by the chills, and to the general soundness of the plates. The data obtained also showed that the tensile properties of unchilled plates decreased, (*a*) as the section thickness increased, and (*b*) as the feeding range of the feeder-head was exceeded. Thus, it seems that tensile properties do indeed reflect the soundness of castings.

Other Work

Experiments were also conducted, with 1- and 2-in. thick plates, to determine whether gate location has any effect on the soundness of side-fed plates cast horizontally. It became apparent that gating at the end of a plate, opposite the fed edge, decreases the soundness of the plate. This decrease in soundness results from the localized heating of the sand in the vicinity of the gate.

Other investigations were conducted on 2-, 3- and 5-in. thick cubes and bar castings to, (*a*) determine the feeding range of the feeder-head, and (*b*) observe the effect of chills. Thermal gradients in the 3-in. cube were found to be below the minimum required, and this cube was somewhat unsound—the 2-in. cube was sound. These experiments showed that the feeding range of the feeder-head is less than T for cubes with a cross-section greater than 2 by 2 in.

Wedge-shaped chills were studied with 2- and 3-in. thick bars that had a length of 4T. The chills for the 3-in. bars were 12 in. long, tapering in width from 3 to $\frac{1}{8}$ in. In thickness they tapered from $\frac{1}{4}$ in. at the narrow end to $1\frac{1}{2}$ in. at the wide end. This work revealed that 2- and 3-in. square bars with a length of 4T can be made radiographically sound with wedge-shaped chills.

Conclusions

The experimental work performed on plates and bars cast from Al/7-per cent. Mg alloy emphasizes that the development and maintenance of large thermal gradients throughout the plates and bars is extremely difficult. The following observations were made in the experiments conducted with horizontal castings:

(1) The feeding range of the feeder-head, in terms of T (section thickness), decreases as section thickness is decreased.

(2) The feeding range of a side-feeder decreases as the section thickness increases. Unsoundness occurs when thermal gradients fall below 5 F. deg. per in.

Producing Sound Castings in Al/7-per cent. Mg Alloy

(3) With a side-feeder, the length of plate (expressed as a function of plate thickness) which is radiographically sound is:—

Thickness (in.)	*Length (in.)*
½	8T
1	5T
2	3T

(4) Chills placed at the end of a casting opposite the feeder-head do not increase the feeding range of the feeder-head.

(5) The feeding range of an end feeder-head is increased by 50 per cent. or more by using wedge-shaped chills on the drag surface of the casting.

(6) A marked improvement in soundness is obtained when multiple gates are used with a top-feeder.

(7) Wedge-shaped chills (with a double taper), used on the drag surface, extend the feeding range in 1-in. thick plates from 5T to 8T. In plates 2 in. thick, the feeding range is extended from 3T to 5T.

(8) Wedge-shaped chills (with a double taper), used on opposite sides of square bars, increase the feeding range from 1T to 4T.

(9) An insulated feeder-head does not have a greater feeding range than an uninsulated feeder-head.

Iron-ore Imports

Imports of iron ore and concentrates (except chrome iron ore and roasted iron pyrites) in November, and the totals for the first 11 months of 1959, and 1958, are set out in the table below. The figures for 1959 are not completely comparable with those for 1958.

From	Month ended Nov. 30.	Eleven months ended November 30.	
	1959.	1958.	1959.
	Tons.	Tons.	Tons.
Sierra Leone	67,045	658,763	658,535
Canada	397,181	2,120,800	2,585,992
Other Commonwealth countries and Eire	1,850	2,405	22,847
Sweden	229,878	2,863,231	2,838,240
Norway	44,331	263,302	251,056
France	35,193	445,988	391,740
Portugal	39,419	121,871	234,960
Spain	29,036	562,401	420,375
Algeria	134,464	1,318,080	1,301,351
French West Africa	28,000	322,072	220,425
Tunisia	44,950	525,377	472,404
Morocco (excluding Tangier) ..	30,900	449,750	352,797
Liberia	37,470	254,129	333,293
Venezuela	154,439	1,313,335	1,244,793
Brazil	62,517	520,083	508,892
Other foreign countries	24,815	192,836	161,142
TOTAL	1,363,488	11,934,423	12,018,872

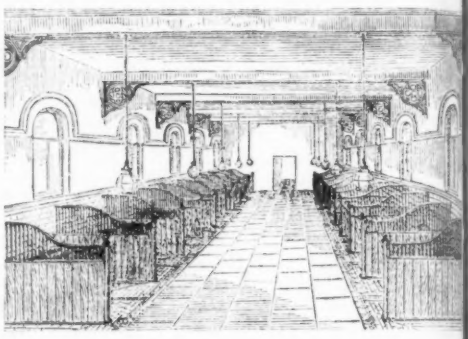
Mr. J. C. M. MACLAGAN, managing director of Greenwood & Batley, Limited, engineers, Armley, Leeds, states that orders received by the firm will ensure full production for some time to come. One order, worth £100,000, is for 60 cold-forging machines, and another, from the National Coal Board, is for electric locomotives for its modernization scheme.

Castings for the Military

By C. J. Robb

The use of cast-iron in military construction work makes an interesting study. The exact date when this metal was first employed by the British army is unknown, but the author estimates it as being January 1690, when, during the War of the Revolution, in Ireland, Van Homrigh, who was Commissioner-General of Provisions under Marshal Schonberg, had ovens built at Waringstown, Co. Down, for baking the army's bread. These ovens had cast-iron sole-plates measuring 4 by 2 ft.

In 1760, Lieutenant-Colonel Thomas Eyre, Chief (Military) Engineer for Ireland, adopted cast-iron pillars, cast in Dublin, to support the roof tie-beams in military stables, some of these beams being up



Military stable, circa 1880, *with the stall division partly constructed of cast-iron.*

to 10-ft. long and 3-in. dia. Two years later, however, a high-ranking cavalry officer complained that horses were prone to kick these pillars, and get thickened hind-legs. In the late decades of the 18th century, Colonel Russell of the 12th Lancers is said to have held the same views about cast-iron pillars and division heel-posts in stalls, but nothing was done. Cast-iron was also used in officers' stables for stall divisions, mangers, water-basins and seed-boxes.

From 1795, cast-iron pillars were used in artillery gun-sheds, to support the roofs over the open fronts, and in 1820 cast-iron runner-plates for the gun-carriage wheels were set in the floor. It was considered that these runners enabled the gun crews to make a more speedy turn-out from the sheds. In 1830, the sergeant's mess at the Royal Artillery Barracks at Charlemont, Co. Armagh installed tables of cast-iron with wooden tops, and similar chairs. Cast-iron stoves for heating barrack rooms also came into use at about this period.

AGREEMENT HAS BEEN REACHED between Associated British Machine Tools, Limited, the sales organization of the Butler Machine Tool Company, Limited, Halifax, and the Lapointe Machine Tool Company, of Hudson (Mass), for the sale and service of Butler products in the United States. A new company, the Lapointe Machine Company, has been formed at Hudson for this purpose.

Equipment and Supplies

Packaged Oil-gas Plants

Incandescent Heat Company, Limited, Smethwick, Staffordshire, report the development of a new process for the gasification of petroleum oil. The process is continuous and does not employ catalysts. Cracking heat is supplied by burning oil and waste products in a compact and simple furnace-setting. The oil to be gasified is injected together with steam into a system which is specially designed to enable a uniform and precise control of cracking temperatures to be exercised. By these means the production of unwanted by-products (particularly carbon and tarry condensates) can be kept to a minimum; more particularly the calorific value of the gas produced can be varied continuously in the range 500 to over 1,200 BTU's per cub. ft. The gas is interchangeable with natural-gas or coal-gas of similar calorific value. Results obtained with a heavy distillate oil indicate that this system can be operated economically over a wide range of throughputs.

Shell-moulding Machine

The foundry division of Electric Resistance Furnace Company, Limited, Netherby, Queens Road, Weybridge, Surrey, has introduced the Reynolds manually-operated shell-moulding machine (see Fig. 1). It is claimed that the machine is simple to operate, and thus can be used by relatively unskilled labour. It has two investment boxes and two heating units for making the two halves of a mould. The boxes are positioned at each end of a steel framework, which has at the centre an idling position for the heaters. The framework of the unit provides a horizontal track on which the patternplates, mounted on rollers, can be moved quickly from the heating positions to their investment boxes. The heating units are fitted with electric elements providing rapid heating by radiation, and are suspended from a rear framework on which they can be easily moved in any direction.

Operating Procedure

When a patternplate has been heated to the required temperature, the heating unit is removed to the idling position and the plate moved to its investment box, where it is tilted at the right angle for securing it to the open end of the box with quick-acting clamps. The investment boxes are up-ended with large-dia. handwheels to provide the dumping action, which compresses the sand to the shape of the pattern. After 8 to 15 sec., depending upon the thickness of shell required, the box can be moved back to its original position and the invested patternplate returned to the track, where it is again covered with a heating unit to complete the curing of the resin-impregnated sand. The shell is finally stripped from the pattern by spring-loaded plungers brought into action by a foot-lever. The machine will make shells up to 18 by 14 in. in size, and it is claimed that one operator can produce 25 complete moulds per hour.

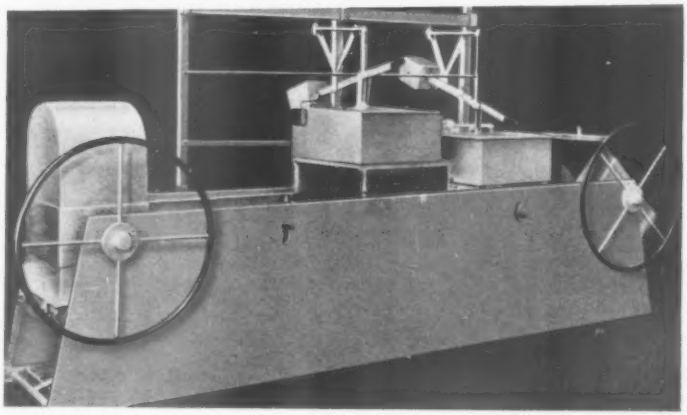


FIG. 1.—*Efco-Reynolds shell-moulding machine, showing the two heater units, one in the central idling position, the other heating a patternplate ready to be fixed to the open end of the investment box on the right. The left-hand box is shown in the dumping position.*

Dicrom Process

Metal Diffusions, Limited, of Isleworth, Middlesex, recently patented the Dicrom process of metal diffusion. It is a thermal process, and basically consists of the removal of atoms of metal from the article to be treated and their replacement by the atoms of the diffusing metal. With chromium diffusion into steel or cast iron, where the atomic masses are similar, no measurable alteration in the dimensions is affected. It is said to be possible with the Dicrom process to produce a depth of diffusion between 1 and 15 thousandths of an inch, depending on composition of the article treated. It is claimed also that the oxidation-resistance of the treated material at temperatures up to 1,180 deg. C. is equal to that of an alloy steel containing 40 per cent. nickel and 22 per cent. chromium. An aluminium/chromium diffusion is stated to resist up to 1,305 deg. C. Amongst suggested applications for the process are glass moulds, fuel-oil pumps and burners, chemical plant and food-processing machinery.

Pumps for Vacuum Degassing

An automatically controlled combination of vacuum pumps has been designed and built by Vacuum Research (Cambridge), Limited, Quayside, Bridge Street, Cambridge, for Birlec Efco (Melting), Limited. (The furnace unit was described in the JOURNAL of December 3, 1959.) These pumps are now in use at Henry Wiggin, Limited, with a degassing unit capable of vacuum treating a 16-cwt. molten charge. The set consists of three pumps in series—a water-ring pump and two Camvac series-1500 mechanical booster-pumps. They are operated by an automatic control-panel which interlocks the pumps and automatic valves. The use of automatic sequencing permits the plant to be operated by semi-skilled personnel, and protects the pump from accidental overloading. All valves shut in case of power failure, and the system is protected against air- or water-supply failure. Special features claimed for this pumping set are: Rapid pump-down to operating pressures; ability to handle dust ejected from the melt, and high pumping speeds—in the range 0.1 to 10-mm. Hg. (treatment pressure).

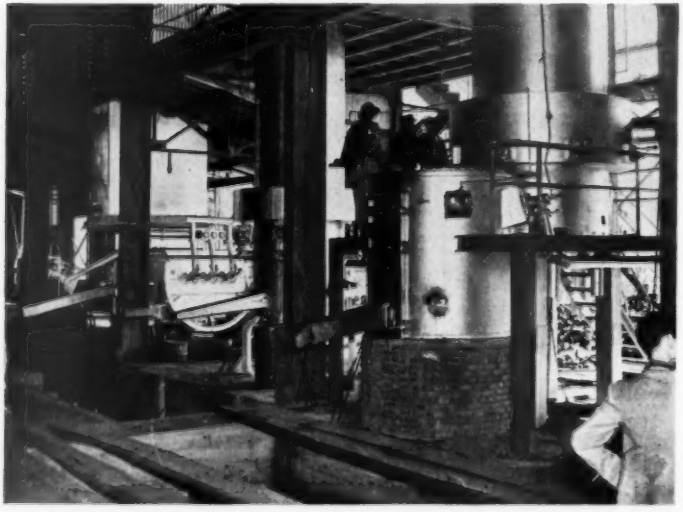
Dominican Republic's First Foundry

As was previously announced in the Journal (October 29, 1959), a sizeable iron foundry has recently been set up in conjunction with the shipyards in the Dominican Republic. The further details and illustrations now available are recorded below. At a capital cost of £145,000, it will be appreciated that the undertaking has a considerable potential in the economic set-up of the Republic, especially when it is borne in mind that at present over £360,000-worth of cast-iron products are imported every year.

Astilleros Dominicanos, C. por A. (Dominican Shipyards, Limited), have set up the Dominican Republic's first foundry on the east bank of the port of Haina. The plant and machinery in use there, which includes cranes, moulding machines and sand-treatment equipment, etc., represents an investment of some £145,000 by the company. The new foundry will concentrate on the production of components for sugar-milling machinery, units of fire-protection equipment, and a large range of cast irons. Two German technicians, Mr. Erwin Dorten and Mr. Dir Burkle, have arrived at Ciudad Trujillo to supervise the installation of the equipment. They will stay for a year, and then will be replaced by Dominican personnel who they will have trained. The first big castings to be produced at the new works were two sugar rolls for each of the sugar refineries at Rio Haina and Barahona. It is interesting to record that, at present, the Republic annually imports over £360,000-worth of cast-iron products. The opening of the new foundry is thus expected to lead to a considerable saving in currency.

Foundry Set-up

The raw material for charging is transported by a 1½-ton crane from ground level to the furnaces. In addition to two cupolas of fairly conventional design, the foundry has three holding furnaces, one fired by gas, the others by coal. The iron is taken from the furnaces by means of three ladles of 15-



10- and 5-tons capacity, carried by a 20-ton crane, and these distribute the metal to the various casting points. The foundry floor is 260 ft. long and

FIG. 1.—*(Above) Platform view of part of the mechanical charging equipment at one of the two cupolas at the Dominican foundry. Vertical hoisting of a square-shaped drop-bottom bucket is arranged, followed by traverse into the furnace shaft and bottom discharge.*

FIG. 2.—*Ground-floor view of the cupolas and holding furnaces, seen from within the foundry. Note the construction of concrete-lined ladle pits in front of the furnaces.*

FIG. 3.—*One of the large geared pouring ladles for which floor control of the hoisting crane has been incorporated.*

60 ft. wide, and is spacious enough for the foundry personnel to move freely and work without interruption. The large crane traverses the complete length of the building, and was built entirely on the site from Astilleros steel. A high proportion of the raw material for the foundry will come from Dominican sources. At present a large liner, the Espana, which originally belonged to the Dominican Merchant Fleet, is now being broken up at Haina,

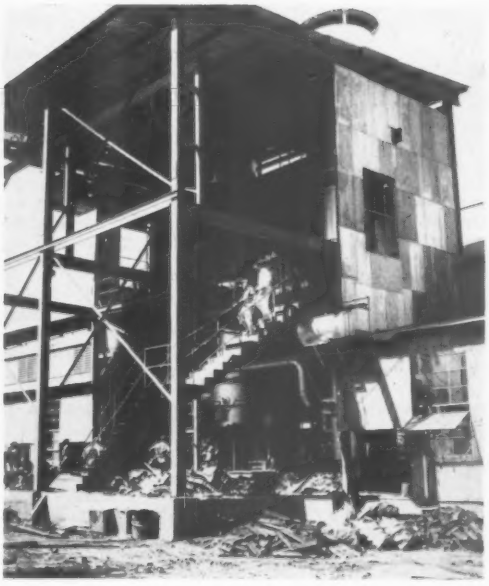


FIG. 4.—*General view of the cupola furnace-house. At the time this photograph was taken the raw-materials stockyard in the foreground was unfinished.*

and scrap iron and steel from it is being conveyed direct to the foundry.

UK Subsidiary for J. I. Case

The formation is announced of the J. I. Case Company, Limited, as a £1,000,000 British subsidiary of the J. I. Case Company of America, which has been in existence for over 100 years and has become one of the world's leading manufacturers of tractors. Its present annual turnover exceeds £70,000,000 ($200,000,000) and its index of expansion shows it to be "the fastest growing tractor line in the world."

Initially, British operations will comprise eight basic models for industrial and constructional use—crawler tractors and dozers up to 100 h.p., shovels up to 2 cub. yds. wheeled loaders from 35 h.p. to 120 h.p. also with a capacity up to 2¼ cub. yds. A complete range of ancillary equipment will be available.

The J. I. Case Company, Limited, will not only be responsible for manufacturing, sales, and distribution in the UK, but also sales to Europe, the Middle East, India, Pakistan, Africa, and other Commonwealth countries. At the company's London administrative headquarters there will be showrooms, repair parts stock, and servicing facilities.

The board of J. I. Case Company, Limited, has Mr. John J. Hutchins as chairman and Mr. W. Muir Robb as managing director. It includes Mr. George H. Thomas, who was formerly associated with the Massey Harris group. Mr. John P. Featherstone, formerly a director of Road Machines (Drayton), Limited, has been appointed director of domestic sales and service.

South Durham Steel & Iron Report

In his statement with the annual report and accounts of the South Durham Steel & Iron Company, Limited, Mr. B. Chetwynd Talbot, chairman and managing director, says that during the current financial year there will be a further increase in the depreciation provision and a considerable increase in interest charged. The ordinary capital, he says, can be raised through conversion of debentures. Such new ordinary would receive both the interim and final dividends.

After taking these factors into consideration, together with the possible effect of the "cloud" which has not yet cleared over the level of production of the heavy section of the steel industry, the directors decided it would not be prudent to increase the dividend.

Capital expenditure, including routine expenditure incurred by the company during the year ended October 3, 1959, amounted to £19,760,000, of which some 32 per cent. was secured from the company's resources. Estimated capital commitments outstanding at balance-sheet date are estimated at £26,860,000, of which £26,390,000 has been authorized on the third stage development for the completion of the South Works at Greatham, in addition to which there is the anticipated increase in working capital required. Commitments still to be expended on the second stage of the developments of the North Works at West Hartlepool amounted to £472,524. Capital expenditure during the year on the South Works totalled £17,200,000, making £22,270,000 expended on that scheme over the past three years out of a total expenditure forecast of £48,660,000.

Douglas (Kingswood), Limited

In publicity issued by the Gas Council, 1, Grosvenor Place, London, S.W.1, a description is included of the use of gas as the main fuel in the activities of Douglas (Kingswood), Limited, of Bristol. This company—well known for the manufacture of motor cycles—introduced the Vespa motor-scooter to England in 1951. These machines are produced under licence from Piaggio of Italy, in a modern factory using all the latest assembly-line methods common to the motor-car industry. The company uses town's gas, supplied by the South-Western Gas Board, for melting, hardening, tempering and carburizing, as well as stoving the synthetic-paint finishes.

In the foundry, too, gas is used for core drying, and melting of aluminium-alloys is carried out in three gas-fired melting furnaces, the molten metal being used for the gravity-die-casting of the light-alloy components. Crankshafts, gears and similar parts of the

FIG. 1.—*View of the gas-heated core-drying installation in the foundry of Douglas (Kingswood), Limited.*

machines require special heat-treatment, and in the carburizing shop, there are three gas-fired muffle furnaces as well as a high-speed tempering furnace. Other non-ferrous components are treated in gas-fired salt-bath furnaces. Most of the furnaces are on automatic temperature control, where thermo-couples measure the temperature and transmit an electrical signal to control pyrometers which operate valves in the gas supply according to the measured temperature. It is reported that this ensures that the temperature is maintained within the close limits necessary for correct heat-treatment which largely determines the life of the machine's components.

As part of its service to industrialists in its area, the South-Western Gas Board has recently opened an industrial gas showroom where factory executives can inspect working examples of infra-red tunnels, natural-draught oven furnaces, recirculating ovens, and other equipment. Anyone can bring along the components in which they are interested and try them out with the equipment in advance of purchase. In addition, there is a wide range of gas burners together with ancillary equipment, such as flame-protection and ignition systems, where automatic temperature-control is featured prominently.

British Standards Institution

Master Schedule of Steel Standards

Over the years a great many British standards for steel have been published to meet the demands of industry, and there are now more than 100 standards covering steel as a material. A number of the steels to these specifications differ from one another only very slightly but, nevertheless, because each is to a recognized British standard grade, steel producers are expected to supply any and every type. There now exists in the steel industry a needless and uneconomic diversity of output which standards have not been able to control, and to remedy matters the BSI, with the collaboration of the steel industry and of important user-interests, has compiled and published the first part of B.S. 3141, "Master schedule of wrought steels," concerned with carbon steels. Further parts of the schedule will deal with (*a*) alloy steels with specified chemical composition and (*b*) steels with specified mechanical properties but without detailed chemical composition.

Phosphate Treatment of Iron and Steel for Protection against Corrosion

The latest and most reliable ways of phosphating iron and steel against corrosion are defined in a new British Standard (B.S.3189:1959). It supersedes an earlier document (PD.539) and is designed for general use in industry rather than for the more specialized requirements.

The five classes of phosphating distinguished are used for protecting iron and steel before painting, varnishing, lacquering or using other organic coating. These five classes are: heavyweight coating with manganese and/or iron phosphate (for maximum protection, particularly under oils and grease); heavyweight coating with zinc phosphate (for good protection plus rapid processing); medium weight for general protection under paint, oils and greases; lightweight, and extra lightweight coatings, principally for light-gauge steel under organic coatings of high protective value.

The standard goes on to give the treatment requirements and precautions for reliable processing, and the particular requirements for creviced components, composite articles, high-tensile steels, and springs. Detailed recommendations for heat-treatment for high-tensile steels and springs are included, and an entire section is devoted to the procedure for inspection and testing.

Plug-and-socket Gas-connectors for Portable Appliances

Whereas the 1948 edition of B.S.570:1959 Plug-and-socket gas connectors for portable appliances concentrated on the specification of dimensions and detailed design, this edition—the work of a committee of experts—concentrates almost exclusively on *functional* requirements. This change of approach was dictated by the development in recent years of types of connector which, although satisfactory in use, did not conform to the designs previously specified.

The specification deals with gas rate and gas soundness; operation of taps and the suitability of connections, washers, nuts and fixing screw holes.

Copies of the above standards may be obtained from British Standards Institution, Sales Branch, 2, Park Street, London, W.1, price 10s., 4s. 6d. and 3s. respectively (postage extra to non-subscribers).

[It would save embarrassment and be a courtesy to the customer if the BSI and other publishers would quote the plus postage price.—EDITOR.]

Russian Patent Law

Protection of Inventions in the Soviet Union

A United Kingdom delegation recently visited the Soviet Union with the objective of discussing with Soviet authorities the protection available in the USSR for United Kingdom inventions. The delegation consisted of Mr. Gordon Grant, the Comptroller General of Patents, Mr. William Wallace, Assistant Comptroller of the Industrial Property Department and Mr. H. R. Mathys, a Fellow of the Chartered Institute of Patent Agents and a director of Courtaulds, Limited. Inasmuch as all foundry-equipment manufacturers, in addition to individual founders are vitally concerned with Patents, it is considered relevant here to report the findings of the mission:—

An inventor, Russian or foreign, has, by Soviet law, the option to seek either a Patent, which gives him a monopoly in his invention which no one may then use without his permission, or an "author's certificate." In the latter case he assigns his invention to the State which remunerates him according to the amount of use made of his invention and the resultant saving to the economy. Since the latter system involves the inventor in less expense and fits much more aptly into an economic system in which all the means of production are controlled by the State, Soviet inventors invariably seek author's certificates rather than Patents. Foreign owners of inventions on the other hand tend to seek Patents.

New Soviet Law

The new Soviet law of April, 1959, so far as it concerns Patents, does not differ in its essentials from the laws of the other countries of the world. There is, of course, in the absence of contractual obligations, nothing to stop the copying of foreign inventions in the Soviet Union unless they are patented there. But the Soviet law, like those of other countries, provides the means whereby, if the necessary steps are taken, inventions can be protected. Before a Patent is granted the invention must be described in a specification, and a search is made through Soviet and foreign Patents and technical literature to make sure that the invention is new. It must also have actual or potential "industrial utility" *i.e.* it must be in a field which, in the opinion of the competent Soviet technical organization, is one in which there is, or is likely to be, activity. (This latter test finds no place in the UK system which demands instead that the invention be not "obvious".) If the invention passes these tests a Patent is granted and, provided renewal fees are paid each year, the Patent lasts for 15 years from the date of application. Subject to the powers reserved to the State to issue compulsory licences (on payment of remuneration to the patentee) "where an invention is of special importance to the State"—and there is something like this in the laws of most countries—it is an offence, during this period, to use the invention without the patentee's consent. The delegation was told that the patentee's monopoly embraces not only the right to prevent others from making goods incorporating the invention, but also the right to prevent them from importing such goods.

If a Soviet factory wishes to use an invention the Soviet Patent for which is owned by a foreigner, the latter is notified by the Chamber of Commerce. The actual contract is negotiated by the Soviet Ministry of Foreign Trade and one of the import/export corporations. The exact division of responsibility is not clear but there is no doubt that the overall responsibility rests with the Ministry. The delegation was told of examples of licences negotiated in this way. It is usually sought to make such licences subject to arbitration before the arbitration tribunals of the All-Union Chamber of Commerce in Moscow.

On the question whether or not a Patent (or author's certificate) shall be granted, the Committee on Inventions and Discoveries has the final word. The Committee has its own appeals procedures which, the delegation were told, include a right for the inventor to appear and be heard. Disputes as to the ownership of inventions are heard by the ordinary courts. If infringement of a Patent is suspected the Committee would, it seems, look into this. In addition the delegation was told, by the Ministry of Foreign Trade, that infringement actions can be brought before the ordinary courts. It seems reasonable to assume, however, that no such action has ever been brought.

Present and Future Possibilities

The Soviet officials who received the delegation expressed themselves as anxious to avoid any misunderstanding and the discussions took place in an atmosphere of cordiality and good will. It was clear that the Soviet officials were interested in foreign Patent practice and the delegation got the impression that, so far as the different economic systems permit, they were tending to bring their law and practice into line with those followed elsewhere. They seemed interested in the International Convention and had evidently given a good deal of thought to it. The delegation stressed both the practical and presentational advantages of membership of the Convention and these seemed to be understood. No indication that Soviet membership in the near future was likely, was however given.

Little use has so far been made, by United Kingdom owners of inventions, of the Soviet Patent system and there is therefore little practical experience. The language problem, and the widely differing concepts of the rights to be enjoyed by the individual as against officials, will no doubt lead to some problems. But it seems clear that, at the worst, the owners of worth-while inventions who contemplate trading with the Russians can only lose the fees they pay and, from the assurance given to the delegation, may well have a good deal to gain if they Patent these inventions in the Soviet Union. In the light of this it seems only reasonable that the Soviet system should be given a fair trial.

The delegation proposes to issue a more detailed report, with a translation of the new Soviet Patent Law at a later date. The opportunity was taken to discuss the protection of Trade Marks in the Soviet Union. The responsibility for this has recently been transferred to the Committee on Inventions and Discoveries. The system appears not to differ substantially from that in other countries and there is no knowledge of complaints about it. The delegation was told that several hundred British Trade Marks are registered in the Soviet Union.

Electrical Engineers Exhibition

The ninth national Electrical Engineers Exhibition, to be held at Earls Court, London, from April 5 to 9, is to be opened by the President of the Board of Trade, the Rt. Hon. Reginald Maudling, M.P., at noon on April 5. For the first time, outdoor electrical equipment will be featured at the exhibition. An area of over 5,000 sq. ft. will be devoted to transformers built by the English Electric Company, Limited, and other leading manufacturers, and an 85-ton electric locomotive, built by Associated Electrical Industries (Manchester), Limited, will also be displayed.

D

Steel Output Forecast

Output of steel in Britain this year is expected to be about 24,000,000 tons, which would be an increase of 4,000,000 tons on last year's output. Pointing out that in both 1958 and 1959 the steel industry spent some £100,000,000 on new plant and development and raised its production capacity by about 1,000,000 tons each year, the British Iron and Steel Federation states that this was done despite the fact that existing capacity, except in a few cases, was not being fully used.

Only in the case of steel sheet have there been shortages due to an unexpectedly swift boom in cars, rising sales of household goods and electrical machinery, and a shift in demand from one kind of steel sheet to another. Cold-reduced sheet production last year was, however, 13 per cent. above that of 1958 and is expected to rise again by perhaps as much as 20 per cent. this year. Further expansion at existing strip mills and the construction of two new mills at Newport and Ravenscraig, work on which is being accelerated, will meet likely demand for sheet and tinplate.

Prospects suggest that there will still be some margin of capacity this year in certain heavy-steel products, as a result of continued slackness of demand from railways, collieries, and shipbuilders. Demand for other types of steel, however, is expected to rise still further. Continued modernization and expansion—at a cost of over £100,000,000 a year—will provide an efficient steel capacity of over 30,000,000 tons by 1965, thus providing a sound basis for competing in world markets.

Pig-iron

In varying degrees all grades of pig-iron are now participating in the trade revival. The output of basic iron is steadily rising and will need to do so to keep pace with the requirements of the steelmakers. The full output of hematite is passing promptly into consumption and foundry requisitions are moving in the right direction.

The substantial rise in iron-ore imports is a further significant development which indicates the expectation of full employment for the blast furnaces.

Ferro-alloys

The call on most items is at much the same level as of recent weeks, with ferro-silicon a major feature of the market and ferro-tungsten continuing to be somewhat quiet. Certain consumers continue to support ferro-sulphide and ferro-phosphorus, and there is a fair demand for calcium silicide. Steady attention is given to ferro-chrome, and ferro-manganese and silico manganese are quite active.

Ferro-niobium is well supported and ferro-titanium is in fair request. There is a good demand for ferro-molybdenum and ferro-vanadium is also of some interest.

Finished Steel

The task of the steel industry in 1960 is to adapt itself to the changed pattern of demand. Slackness in the shipbuilding trade still persists, but the impact of this decline on the plate mills has been modified by big contracts for steel pipelines. For railway and colliery requirements there are no alternative outlets and continued slackness in this branch of the steel trade seems to be indicated. But the already big demand for other types of steel products, ranging from cold-reduced sheet and light steel for durables to heavy constructional steel, is still gathering momentum and works are now assured of full employment for the first quarter of the current year, with delivery dates extending well into the second quarter.

European Foundry Apprentice Competition

Brief particulars are now available of the arrangements made to date for the holding in the United Kingdom of this year's European Foundry Apprentice Competition. The function will be staged during the week commencing May 22, and it is expected that neophyte foundrymen of a dozen or more nations will participate. In some cases, the national aspiration will be in the hands of teams of three apprentices, but from other countries, only one apprentice may be sent. The contestants will be received in Birmingham on Sunday, May 22, and will take the written part of the competition at the College of Advanced Technology, in Birmingham, on the following day. In the late afternoon of Monday, they will journey a dozen miles or so to the steel foundry of F. H. Lloyd & Company, Limited, at Wednesbury to inspect the premises where the practical tests will be staged on the Tuesday and Wednesday. On Thursday, the competitors will return to the College of Advanced Technology for the drawing section of the contest, followed in the afternoon and evening by a sightseeing tour in the Stratford-on-Avon area. The party will travel to London on Friday and participate in a coach tour of places of interest before assembling for a dinner party and the closing ceremony in the evening at the Tallow Chandlers' Hall. Dr. J. G. Pearce, C.B.E., is chairman of the competition judges, who are drawn from the individual nations represented in the competition.

Physical Society's Exhibition

The Physical Society's Exhibition is to be held this year at the Horticultural Society's Halls, Westminster, London, S.W.1, from January 18 to 22. Amongst the exhibitors will be the Solartron Electronic Group, Limited, of Thames Ditton, Surrey, who, on stand No. 94, will be showing more than 20 new instruments, including computers, volt meters, amplifiers, strain gauges, an X-ray spectrometer, milliameters, etc. Another exhibitor, the Cambridge Instrument Company, Limited, will have on display recorders, potentiometers, and at its own showrooms at 13, Grosvenor Place, London, S.W.1, a scanning X-ray micro analyzer.

Of the instruments being shown by the Kelvin & Hughes group, only one component—the acceleration inductance transducer—has been on display at previous Physical Society exhibitions. Amongst the new instruments will be a barometric switch designed to operate under severe environmental conditions: this is a high-stability unit consisting essentially of a capsule-operated microswitch; a precision force-balance unit intended to meet requirements for an extremely accurate, sensitive and robust form of pressure-measuring device; and a miniature force-balance unit which is claimed to be ideal for use as a pressure transducer, where a cheap but reliable source of pressure measurement and power output is required.

Acknowledged with Thanks

In addition to firms sending greeting cards, calendars, etc., listed in last week's issue of the JOURNAL, similar expressions of goodwill have been received from the following:—American Colloid Company; Czepel Iron & Metal Works (Hungary); Industrial Welfare Society; A. A. Jones & Shipman, Limited; A. E. Jones (Pattern Maker), Limited; W. Kajoch (Polish Academy of Sciences); Print for Industry, Limited; Pyrene Company, Limited, and John Vickers & Sons, Limited.

Scottish Light Iron Castings

(From our Scottish Correspondent)

Although the word recession still frequently occurs in references to light iron castings in Scotland, there is a considerable amount of optimism in the trade about future prospects. The "recession" stems from a comparison of the present state of the industry and the years when the post-war boom in housing and other forms of construction was at its height. The bottom dropped out of the boom a few years ago and the industry has never recovered. During the past year, however, the foundries have been much busier than they have been for some time, the increased activity being mainly accounted for by heavier demands for baths, rainwater and soil pipes.

The increase in orders has had its effect on the number of workers employed—at least on those who have been on short-time working for so long. At about this time last year there were nearly 300 foundry workers under-employed in the light-castings industry in the Falkirk area alone. Almost all of these are now fully employed, a change which augers well for the future, bearing in mind, however, that the light castings industry normally experiences a seasonal recession of trade in the spring. What the future holds is difficult to foretell but the outward signs are at least encouraging.

This virtual absence of under-employment has been accomplished during the year when several foundries were closed down, but such closures have been rather in the nature of merging and streamlining the light-castings trade to meet the need for modern equipment and processes. Two foundries were closed under such circumstances during the year with almost negligible redundancy.

Principal Factors

The easing of hire-purchase restrictions and the general economic improvement throughout the country have been the principal factors which have led to improved sales of the manufactures of the castings industry. Although Scottish products are still selling south of the Border, transport costs have raised some problems in this respect, but Scottish firms still sell more in England than English manufacturers sell in Scotland.

During the year, two cases of Scottish local authorities placing contracts with English firms in preference to Scottish concerns were given some publicity but these were subsequently settled with advantage to the home market. On the whole, town and county Councils are realizing that where possible, especially if prices are fairly competitive, they should help the local trade and see the light-castings industry in Scotland does in fact get the lion's share of such orders.

Although there has been some concern expressed about the future of the industry, this has not affected the intake of apprentices and there has been no trouble in getting boys into the various trades. The training scheme for apprentices operated in Falkirk is considered to be one of the best in the country.

Competition in overseas markets shows no sign of abating, and more than ever there is a great dependence on the home market, although one Falkirk firm, specializing in the manufacture of heavy-duty catering equipment, was able, in the face of competition from several European countries, to secure the contract for the installation of the equipment in the canteens of the NATO headquarters at Port Dauphine, Paris.

Sales Experiments

Two experiments which may revolutionize the selling and buying of fires, stoves, boilers and other solid-fuel appliances, were announced by one of the largest manufacturers in the latter part of the year. The experiments are designed to demonstrate new, "streamlined" methods of sales and service which the builders' merchants can offer to the customer. The new types of service include such things as expert advice in the customers' own home before he chooses, and a single comprehensive hire-purchase agreement through which all the equipment and all the builder's charges and installation costs can be covered by a single monthly payment. The value of an aggressive sales policy is obviously being realized by the manufacturers.

In addition to all the new houses which are being built there remains many more which have become middle-aged or old, and which could be considerably improved by the installation of modern appliances and equipment. This represents a large potential not only for the foundries but for builders' merchants and the building industry as well.

No mention of the light-castings industry in Scotland would be complete without mention of the bi-centenary of the Carron Company celebrated last year. Founded on the north bank of the River Carron, Stirlingshire, in 1759, this company has played a very important part in the industrial development of Scotland.

In the Picture . . .

Left to right: Mr. C. W. Briggs, technical and research director of the Steel Founders' Society of America; Dr. Arthur H. Sully, director, British Steel Castings Research Association; Mr. R. L. Gilmore, president SFSA, and president of Superior Steel & Malleable Castings Company; and Mr. Dale L. Hall chairman of SFSA Technical and Operating Committee. The occasion was the fourteenth conference, held in the US recently, of the Technical and Operating Committee of the Steel Founders' Society of America, at which Dr. Sully presented the BSCRA exchange paper; Mr. Hall presided at the gathering.

Book Reviews

Basic Electronics (in six parts). Published by the Technical Press, Limited, 1, Justice Walk, London, S.W.3; price 10s. 6d. per part, or 54s. per set.

"Basic Electronics" is a sequel to "Basic Electricity" and, like its forerunner, it is illustrated by numerous "visualizations." The subject matter of this work covers a wide field in electronic engineering, as will be evident from the following schedule of topics discussed—power-supply units, rectifiers and rectifier circuits (metal and valve), filter circuits, valve characteristics, audio, video and radio-frequency amplifiers, microphones, oscillators, transmitters and transmitter circuits, aerials, receivers, frequency modulation. The last section deals with transistors and semi-conductor diodes; this is a good introduction to solid state electronics which includes an account of the characteristics, utilization and circuitry of transistors.

Worthy of special mention are the clear circuit diagrams with which the whole work is liberally sprinkled. The mathematical aspects of electronics theory are discussed briefly, but clearly, and without mathematical digression. Each chapter is followed by a brief review of the chapter's chief points and this makes for effective recapitulation.

It is difficult to think of any branch of engineering or applied science where electronics is not already an accepted tool, and without doubt "Basic Electronics" will be of value to the many who are concerned to use electronic devices and who wish to gain an insight into the fundamentals involved.

J. E. GARSIDE.

Progress in Metal Physics, Vol. VIII. Edited by Bruce Chalmers and R. King. Published by the Pergamon Press, 4 and 5, Fitzroy Square, London, W.1; price £4 10s.

This book consists of five metallurgical reviews of a theoretical nature. The high-brow founder may first be attracted to an article by C. Elbaum on "Substructures in Crystals grown from the Melt." These curious substructures are surfaces of discontinuity in neighbouring regions of a metallic crystal which can be accounted for by suitable networks of atomic dislocations. The origin of the dislocations themselves is considered, and it is learnt that single crystals of silicon have been produced free from these defects. Attempts have also been made to avoid a striated type of substructure by what is known as the "soft mould" technique. Rods of aluminium were placed in an oversized Alundum crucible and tamped with fine alumina to favour axial heat-flow and reduced thermal strains during the subsequent melt and growth treatment. The practical aspects of these detailed studies arise in the production of crystals for transistors, especially when impurities are present.

An account by F. Weinberg of "Grain Boundaries in Metals" discusses dislocations at boundaries and whether the boundary region melts at a slightly lower temperature than the bulk metal. This appears to depend upon the angle of tilt made by the boundary with the crystal. In the same field, an excellent article by W. M. Lomer deals with "Defects in Pure Metals," including a summary of what is known about the imperfections produced by neutron and other irradiation, by cold work and by quenching.

The other reviews are the "Work-hardening of Metals" by L. M. Clarebrough and M. E. Hargreaves, and "X-ray Studies of Deformed Metals" by B. E. Warren. The first two authors admit that the rate of progress in metal physics has led to "some confusion in terminology" and one might mention that the present term "easy glide," introduced in 1951 for the initial portion of the three-stage stress/strain diagram, ignores the original use of the term introduced in 1924 by Millington and Thompson as a slip direction. All the factors and difficulties are reviewed and the authors conclude that "some progress is apparent towards a general explanation of the work hardening of single crystals and polycrystals . . ."

Warren's detailed paper points out that the really important features in X-ray studies of cold-work are the precise shapes, displacements and asymmetries of diffraction intensity peaks. Geiger-counter measurements give better results than the older photographic methods. "No simple general picture of the cold-worked state suffices at the present time to cover all the metals."

This expensive progress report is well produced and illustrated with half-tone and line diagrams. It would be better still if its 322 pages of text received more than the one-and-a-half pages of subject index provided.

HUGH O'NEILL

House Organs

Mettle, Autumn, 1959. The house magazine of the Marshall Organization, Stafford House, Norfolk Street, London, W.C.2.

In this issue, roads, reservoirs and the channel-tunnel are subjects which are covered by well-illustrated articles. In connection with the last, it seems that Fowler's of Leeds supplied the boring machine for a pilot excavation begun in 1881. It would be interesting to learn just how it worked.

From perusal of many of these modern well-produced house organs, the reviewer is strengthened in his belief that some of them make much more interesting reading than the "glossies" which litter doctors' and dentists' waiting-rooms.

Les Aciers Fins et Speciaux Francais. Quarterly review published by the Chambre Syndicale des Producteurs d' Aciers Fins et Speciaux, 12, Rue de Madrid, Paris, 8.

This magazine comes in four languages—English, French, German and Spanish—and deals with subjects of major interest to the special steel trade. The opening article is about the supply of manganese for the French steel industry, and it may surprise some readers to learn that France is the third amongst the world's producers of ferro-manganese and the leading exporter. An interesting article covers the manufacture of scythes, sickles and forks.

Wiggin Nickel Alloys No. 53. Published by Henry Wiggin & Company, Limited, Thames House, Millbank, London, S.W.1.

This issue includes articles on the Conway-powered Boeing 707 and the power behind the Thor, Jupiter and Atlas rockets. A further contribution is an article by Mr. R. McGlashen, on the use of the Brightray series of nickel-chromium electrical resistance materials in pre-heating for welding and stress-relieving of large vessels. Other subjects dealt with are heating elements for electric furnaces and sea-water evaporators.

A NEW SERVICE DEPOT for London and the Home Counties has been opened at Ripple Road South, Barking, Essex, by the British materials handling division of the Yale & Towne Manufacturing Company.

Notes from the Branches

Bristol

It is reported that the first four meetings of the current session of the Bristol branch of the Institute of British Foundrymen have been well attended with an average attendance of 35, three of the meetings having been held in Bristol and one at Exeter.

On November 20, 54 members and friends were present to hear an excellent paper by Mr. W. B. Parkes on "Modern Sand Practice." In presenting the paper, Mr. Parkes emphasized the need for strict control of sand at all stages throughout its service life in the foundry. Reports of discussion on this paper when previously presented at other meetings have already appeared, but the following points made by Mr. Parkes in replying to questions are well worth recording:—(*a*) Carborundum sands are useful in ensuring a good finish to castings, but for the general run of castings can be very expensive. (*b*) Finning on core sands can often be overcome by the use of a sand with mixed grain-size, a sand of uniform grain-size is of little help—zircon sands are also useful, and (*c*) scabbing should not occur on castings which are correctly poured and where correct use is made of the advantages of Ferrostatic pressure, which should tend to prevent "lifting" of the sand face.

The meeting on December 11 was unique in branch history, since papers were presented by two branch members and, at the commencement of the meeting, the national junior vice-president, Mr. D. A. Richards, presented the Buchanan Silver Medal to Mr. J. L. May, a branch member, for his success in the 1959 final examination of the City and Guilds Institute, repeating his success of 1958 in the intermediate examination in foundry practice.

Experiences with CO_2 Process

Mr. G. W. Brown, A.I.M., branch hon. secretary, then presented a paper "Observations on the Occurrence of Rust-staining on Copper-base alloys," which had been written jointly with Mr. C. B. Searles, B.SC., who presented the second paper of the evening entitled "Some Experiences with the CO_2 Process in the production of Copper-base alloys." In presenting the latter paper, Mr. Searles pointed out that although many foundries had adopted the CO_2 Process over the last five years, little information had been published on the difficulties of use of the Process, and it was the purpose of the paper to outline certain of these difficulties which had been encountered in the authors' foundry. The first of these troubles had been with knock-out of many types of gunmetal castings of fairly thin section, since pelleted pitch, which had been used in the cores, had not been burned out at the core centre due to the low casting temperature and the small amount of heat dissipation from the thin-sectioned castings. The pitch had only become fused, and on cooling acted as an internal "cement" creating a rock-hard core which often needed chipping out. This condition was not found in cast-iron founding where the higher pouring temperatures would ensure more burning away of the pitch.

Another point referred to by the author was the apparent inconsistency of mixes and the wide variations in times required to satisfactorily gas cores. He said it had been shown after considerable experimental work, that these factors were due to variations in the viscosity of the silicate additions, brought about by daily variation in the air temperature and the fact that during milling the temperature of the sand mix was liable to be increased by 2 to 3 deg. C. The rate of gassing a core, he continued, was dependent upon the distribution of the silicate throughout the mix, which in turn was controlled by its viscosity and the effectiveness of milling procedure. Gassing technique was also affected by the shape of the core or mould, the distance the gas had to travel, and the rate of gassing and pressure employed. Another point made by Mr. Searles was that in assessing gassing times consideration must be given to the variations in core density, taking into account whether it had been made by blowing or hand ramming.

DISCUSSION

In replying to questions the authors made the following points:—

(*a*) Plumbago had been used to replace pelleted pitch in the core mix since it would tend to volatalize rather than fuse, thus ensuring better break down.

(*b*) The freezing of CO_2 gas in the gassing equipment had been overcome by the use of piped gas under pressure.

(*c*) It had usually been found best to introduce large quantities of gas into a core slowly than to gas rapidly with smaller quantities of gas.

(*d*) Phenolphthalein had been used as a colour indicator to ensure complete gassing of the sands.

(*e*) With regard to the better performance of steel-shot, mentioned in the first paper, and its failure to become embedded in castings as compared with the iron-shot, it was considered that the steel, being of more uniform hardness, wore away more slowly and evenly and there were no sharp projections on the shot which would act as keys by which embedding could occur. The authors also emphasized the need for adequate extraction of fines from the shotblasting cabinet whether steel- or iron-shot was being used.

Mr. Gabb, branch senior vice-president, in proposing a vote of thanks, said he felt that the branch was indebted to the authors for the two papers which had been presented. These had been of great interest and were at the same time of real practical interest, dealing as he said "with problems which we all have seen at some time or other, but never really noticed."

East Anglian Section

On Monday, December 21, 1959, the East Anglian section held their monthly meeting in the Lecture Hall, Central Library, Ipswich, when members and visitors were present to see three splendid films (with commentaries) dealing with various aspects of founding. These were: "Britain's Heaviest Steel Casting." "Design and Patternmaking," and "New Ideas at Work in the Foundry." The first was an excellent colour and sound film of 17-min. duration, dealing with the production of a huge steel casting at the works of the English Steel Castings Corporation, Limited, from the planning to the loading for shipment. The second was a film dealing with patternmaking for propellers, and the third, a film showing ideas being put into operation and the resultant increase in working efficiency. An open discussion followed, after which the chairman, Mr. T. D. Oughton, thanked the secretary for his work in securing the films.

OWING TO THE TRANSFER of Mr. J. R. Crane within the Imperial Chemical Industries' organization, the paper on "The Newer Metals," to be given to Slough section of the Institute of British Foundrymen on March 29, will be delivered by Mrs. M. K. McQuillan. (Mrs. McQuillan is leader of the ICI team on research in new metals).

ISI Translations

From amongst the most recently published lists of translations available from the Iron & Steel Institute (4, Grosvenor Gardens, London, S.W.1), the following have been selected as being of interest to founders. The price quoted is that for single copies, postage extra, there being reductions for quantities ordered. Readers writing for translations, or for further information, should mention this Journal when doing so.

1440 MEASURING THE DUST CONTENT IN INDUSTRIAL GASES AND IN THE AIR—MEASUREMENTS OF DUST ON THE GROUND. Guthmann, K. *Stahl u. Eisen*, 1959, Aug. 6, pp. 1129-1141. (£7.) The most important dust-measuring instruments for investigating the problem of air purification and for its control are described. Reports on years of experience of dust-content measurements in industrial gases and in the atmosphere and of determination of particle number in gases or air as well as on new experiences with dust-deposit-measuring instruments.

1454 QUANTITATIVE INVESTIGATION OF DENDRITIC SEGREGATION IN SOME IRON ALLOYS. Philibert, J., & C. de Beaulieu. *Rev. Mét.*, 1959, Feb., pp. 171-178. (£4.)

1472 ON THE HEAT-TREATMENT OF AUSTENITIC-MANGANESE STEELS. Fremunt, P., & A. Lorenc. *Slévárenství* (Prague), 1959, Aug., pp. 309-316. (£6 10s.)

1474 REACTIVITY OF VARIOUS COKES. Küntscher, W., *et al. Neue Hütte*, 1955, Oct., pp. 6-10. (£4 5s.) The methods used up to now for testing coke proved to be inadequate for metallurgical evaluation. A test procedure has been described that seems to give satisfactory characteristic values. The metallurgist is concerned with obtaining a reactivity suitable for a given process, *i.e.* on no account does he want a high reactivity at low temperatures. In the blast-furnace process it is the main function of the coke to generate a high temperature in front of the tuyeres. The values determined with the test rig employed here show the different reaction behaviours of a number of cokes as a function of temperature as well as of atmosphere.

1534 DEVELOPMENT AND PRESENT STATE OF THE PROBLEM OF THE INTRODUCTION OF AN AUTOMATIC COUPLING INTO THE EUROPEAN STANDARD-GAUGE RAILWAY SYSTEMS. Rohde, W. *Eisenbahn Technische Rundschau*, 1959, (4), 163-169. (£1.) A review of the hazards of shunting with statistics, and an historical review of the introduction of automatic systems into the US, USSR, Japan, China, Canada, South Africa and Australia, in replacement of screw couplings, with a survey of the systems used are given. Recommendations for conversion of the European rolling stock are made.

1486 DETECTION OF DEFECTS BY ULTRASONIC TESTING. Krainer, H., & E. Krainer. *Schweisstechnik*, 1958, Mar., pp. 28-32. (£4.) Influence of geometric factors on results of ultrasonic testing of heavy forgings. (Abstract *JISI*, 1959, July, p. 317c.)

1517 OBSERVATIONS ON FOUNDRY SILICOSIS. Schmid, H. J. *Z. für Unfallmedizin u. Berufskrankheiten*, 1958, Sept., 221-231. (£3 5s.) This paper was presented at the 43rd annual meeting of the Swiss Society for Industrial Disease and Accident in November, 1957. It is based on the experience of the author in Schaffhausen where, as a result of technical hygiene measures, silicosis in sand blasters has for practical purposes disappeared. In contrast to this the introduction into industry of screening and other routine X-ray examination has brought to light a surprising number of cases of pneumoconiosis in foundry workers engaged in a variety of jobs other than that of sand blasting. With improvement in the methods of examination the diagnosis of silicosis in foundry workers has increased steadily. In 1944-49 the incidence found by the author was 11 per cent. and in 1955 the incidence reported by another observer was 30 per cent. In a special examination of 20 workers exposed to the dust of emery, which contains but little silica, the incidence of silicosis in these men who had worked at their job for over 10 years was over 50 per cent. Silicosis in foundry workers, in contrast to that of sand blasters in the past, is in general considered to be a mild condition which may not give rise to any symptoms or disability. This view is held by many observers and is here discussed at length with reference to published reports and the experience of the author, who is of the opinion that the form of silicosis found in these workers is not to be regarded as a negligible condition. There is also a discussion on bronchitis and conditions of asthmatic types in foundry workers which may be caused by silicosis but may, on the other hand, be due to non-specific irritation by dust or be of allergic nature. (Occupational Hygiene Abstracts.)

The following translations are among those recently made by Mr. H. Brutcher, Technical Translations, P.O. Box 157, Altadena, California, USA, to whom enquiries should be addressed.

HB 4520 NATURE OF THE X-PHASE (IN GREY IRON). Tavadze, F. N., & I. A. Bairamashvili. *Lit. Proizv.*, 1958, (11), pp. 18-20.

HB 4621 BEHAVIOUR OF NITROGEN IN THE MELTING OF IRON-BASE ALLOYS IN VACUUM ARC (AND INDUCTION) FURNACES. Shabanov, D. A. *Izv. VUZ, Chern. Metall*, 1958, Nov., pp. 37-40. ($3.85.)

HB 4636 STRUCTURE OF ELECTRO-SLAG WELDS IN NODULAR CAST IRON. Poznyak, L. A., *et al. Avtom. Svarka*, 1958, (10), pp. 67-74. ($6.50.)

HB 4708 GAS-HEATING OF INGOT SINKHEADS. Konovalov, K. N., *et al. Stal*, 1958, (4), pp. 311-316. ($8.80.)

HB 4714 ELIMINATION OF NON-METALLIC INCLUSIONS FROM METALS. Spasskii, A. G., & N. S. Klyagina. *Izv. VUZ, Tsvet. Met.*, 1959, (3), pp. 118-122. ($4.80.)

IBF Malvern Conference Fund

The Council of the Institute of British Foundrymen acknowledges with appreciation the following subscriptions received for the special fund which is being raised in connection with the conference which is being held in Malvern in June. It should be noted that Dr. H. T. Angus of the British Cast Iron Research Association, who is honorary treasurer of the conference fund, will be very pleased to receive additional subscriptions:—

	£	s	d
Birmid Industries, Limited	500	0	0
Shotton Bros, Limited	300	0	0
Austin Motor Company, Limited ...	100	0	0
F. H. Lloyd & Company, Limited ...	100	0	0
Coalbrookdale Company, Limited covering all firms controlled by Allied Ironfounders, Limited, Midland Division, *i.e.* Aga Heat, Limited, Burton Foundry Company, Limited, James Clay (Wellington), Limited, Coalbrookdale Company, Limited, Planet Foundry Company, Limited, Sinclair Iron Company, Limited, and Welwyn Foundry Company, Limited	50	0	0
Hill Top Foundry Company, Limited	50	0	0
Chamberlin & Hill, Limited	50	0	0
Beans Industries, Limited	50	0	0
C. & B. Smith, Limited	50	0	0
John Harper & Company, Limited ...	47	5	0
Belliss & Morcom, Limited	26	5	0
Sanbra, Limited	26	5	0
H. W. Lindop & Sons, Limited ...	26	5	0
Parkinson Cowan Appliances, Limited	25	0	0
Henley Foundries, Limited	25	0	0
Repton Foundry, Limited	25	0	0
Triplex Foundry, Limited, covering their various branches	25	0	0
J. Brockhouse & Company, Limited ...	25	0	0
English Electric Company, Limited ...	21	0	0
Arthur Shaw & Company, Limited ...	15	0	0
Duport Foundries, Limited	10	10	0
Hunt Bros (Oldbury), Limited ...	10	10	0
Lee, Howl & Company, Limited ...	10	0	0
Simplex Electric Company, Limited ...	5	5	0
Alley & MacLellan, Limited	5	5	0
G. Clancey, Limited	5	5	0
Josiah Parkes & Sons, Limited ...	5	5	0
Thos. Green & Company, Limited ...	5	5	0
Brockmore Foundry Company, Limited	5	5	0
Audley Engineering Company, Limited	5	0	0
Coventry Malleable & Aluminium, Limited	2	2	0
Jones & Attwood, Limited	2	2	0
Total	£1,608	14	0

Company News

SCOW's Financial Statement

During the past financial year investment by the Steel Company of Wales, Limited, in fixed assets passed the £200,000,000 mark and its production of steel ingots—in 1951 640,000 tons—reached 2,324,000 tons. By the end of the current year the annual rate of production should be running at 3,000,000 tons. The third development plan designed to produce this output is all but completed and the fourth development plan is already in active preparation.

In his annual statement, the chairman, Mr. Harald Peake, says that trading profit in the past year was a record at £23,291,000, of which £6,646,000 was provided for depreciation and £2,650,000 placed to plant depreciation reserve. While nearly £17,000,000 was spent during the year on new plant and fixed assets it was only necessary to raise £6,500,000 by further borrowing.

This came from the Iron and Steel Holding and Realization Agency to which the company now owes a total of £23,000,000 (out of an authorized maximum of £40,000,000) which is repayable by the end of 1964. The estimated cost of the fourth development plan—£33,000,000—can, Mr. Peake thinks, be met from internal sources and temporary bank borrowings. The final dividend of 1s. 3d. brings the total dividend to 2s. (1s. 9.6d. including a special interim).

BAIRD & TATLOCK (LONDON), LIMITED, scientific instrument manufacturers, of Chadwell Heath (Essex)—The offer by Derbyshire Stone, Limited, of nine of its 5s. units for every four of the company's £1 shares has been accepted by holders representing 98.9 per cent. of the capital. It is stated that the balance will be acquired shortly.

C. & J. HAMPTON, LIMITED, manufacturers of engineers' and woodworkers' tools, of Sheffield—The directors recommend a final dividend for the 15 months ended September 30 of 7½ per cent. With the first and second interim dividends already paid this makes 22½ per cent. (15 per cent. for previous year), payable February 17. There is to be a one-for-two scrip issue. The new ordinary shares will rank for dividends declared subsequent to February 16, 1960.

ATLAS STEEL FOUNDRY & ENGINEERING COMPANY, LIMITED—The chairman, Mr. A. C. Strathie, states that orders are not coming in as fast as work is going out. There is keen competition for the reduced tonnages available to the steelfounding industry and heavy downward pressure on prices with consequent lower profit margins. Fixed assets appear at £457,344 (£88,983), reflecting the April revaluation. Commitments in connection with a new blast furnace to be started up in a few months' time total £80,000.

BUTLER MACHINE TOOL COMPANY, LIMITED—The chairman, Mr. J. W. Butler, states that the main reason for the fall in trading profits to £135,307 (£200,042) was a decline in output due to the production of an unusual number of new design machines and considerable alterations to the company's standard products to ensure that they were completely up to date. The order-book has declined sharply over the past 18 months, but it still remains at a high figure, although output is stated to be affected by the unbalanced intake of new orders.

LANCASHIRE DYNAMO HOLDINGS, LIMITED—The directors have received the offer from Metal Industries, Limited, and are giving it their full consideration. A considered statement will be made as soon as possible. Terms of the offer are £4 new ordinary stock in Metal Industries plus 30s. in cash for every £5 ordinary stock in the company. If the offer is accepted stockholders will be paid a dividend of 10 per cent. to cover the period to the end of March. Metal Industries is also offering £6 new 5 per cent. preference stock for every £5 of Lancashire Dynamo 5½ per cent. preference stock.

Nuclear Power Group's Fusion

Under the title of the Nuclear Power Group, Limited, two of Britain's nuclear power companies—the Nuclear Power Plant Company, Limited, and the A.E.I.-John Thompson Nuclear Energy Company, Limited—have become partners. Chairman of the board of the group is Viscount Chandos, who is also chairman of Associated Electrical Industries, Limited, and its principal subsidiaries, and a director of Imperial Chemical Industries, Limited, and the vice-chairman is Mr. R. Edwin McAlpine, a director of Sir Robert McAlpine & Sons, Limited, and associated companies.

Among the objects of the new group are the design, development, and sale of nuclear reactors of all kinds, the construction of complete nuclear power-stations at home and abroad, and the construction of nuclear units for ship propulsion. It will also supply necessary components and materials and conduct research and development in matters concerning nuclear energy. The nuclear power-stations at Bradwell (Essex) and Latina (Italy), which are at present under construction by the Nuclear Power Plant Company, and the nuclear power-station at Berkeley (Gloucester), which is being built by A.E.I.-John Thompson Nuclear Energy Company, are to be completed by the two companies in partnership.

Headquarters of the group will be at Radbroke Hall, Knutsford (Cheshire), and each company will have three representatives on the board—Viscount Chandos, Sir Edward Thompson, and Mr. Harry West (A.E.I.-John Thompson), and Mr. R. E. McAlpine, Mr. H. H. Mullens, and Sir John Wrightson (Nuclear Power Plant). Mr. A. J. Sayers will be general manager.

The merger brings together in the field of nuclear power plant construction and research Associated Electrical Industries, Clarke, Chapman & Company, Limited, Alex. Findlay & Company, Limited, Head, Wrightson & Company, Limited, Sir Robert McAlpine & Sons, C. A. Parsons & Company, Limited, A. Reyrolle & Company, Limited, Strachan & Henshaw, Limited, John Thompson, Limited, and Whessoe, Limited.

European Purchasing Conference

The second conference of the European Federation of Purchasing will be held in Scheveningen, Holland from April 21 to 23.

Among the sessions will be:—"Common Problems of Buyers in Europe" by the President of the Federation, M. Paul Gros, Purchasing Director, French National Railways; "Organization of a Purchasing Department—Selection and Training of Personnel" by J. Murray Grammer, director-general of Purchasing & Stores, National Coal Board; "Relations between the Purchasing Department and other Departments" by Reg. Rat. a. D. Hanns Rump, and "Terms of Purchasing" by T. Bell, purchasing officer, Union Company, Oslo.

The conference fee will be 50 Dutch florins (about £5) per person and UK buyers requiring details of the conference are invited to write to:—the secretary, Purchasing Officers Association, Wardrobe Court, 146A, Queen Victoria Street, London, E.C.4.

Personal

Mr. WILFRED H. DINES has joined the board of Midland Tar Distillers, Limited.

Mr. D. J. OLIVER has been appointed a director of Laporte Titanium, Limited, a subsidiary of Laporte Industries, Limited.

Mr. S. W. BARTLAM retired on December 31, after 47 years as export manager of W. Canning and Company, Limited, of Birmingham.

Mr. HARTFORD M. KING, O.B.E., sales director of Geo. W. King, Limited, Stevenage, Herts, has been appointed assistant managing director.

Elcontrol, Limited, announce that Mr. B. A. WORSWICK B.SC. (HONS), has been appointed to the post of technical director with a seat on the board.

Mr. H. FLETCHER, Mr. J. W. HOBDAY and Mr. G. HENDERSON, directors of Derbyshire Stone, Limited, have been appointed to the board of Baird & Tatlock (London), Limited.

Mr. F. RHODES, secretary of Dronsfield Brothers, Limited, Atlas Works, Oldham, for the past 17 years, has been appointed a director. He has been with the company for 38 years.

After nearly 38 years with the Lucas organization, Mr. F. E. J. BROWN has retired as director and service manager of Joseph Lucas (Sales and Service), Limited, Great Hampton Street, Birmingham.

Mr. B. J. WEST has been appointed secretary of Stone-Platt Industries, Limited. He succeeds Mr. H. T. LOVELAND who has retired from the post and also from the board of Platt Brothers & Company, Limited.

After 40 years' service with the Ministry of Labour, Mr. J. J. BARRY, who has been deputy manager of the Coventry offices of the Ministry since 1948, has retired. He is succeeded by Mr. R. H. COOK from Darwen.

Mr. A. M. MACKINTOSH has joined the board of Brown Brothers, Limited, Edinburgh. He retired recently from Shell-Mex & B.P., Limited, where he held the appointment of general manager (sales) for many years.

Mr. DONALD CAMPBELL has been appointed managing director of Dowty Marine, Limited, a member of the Dowty Group, Limited. Mr. Campbell will visit Canada to attend the Toronto Boat Show which opens on February 5.

Mr. H. H. E. GEORGEL has been appointed contracting division manager of the Consolidated Pneumatic Tool Company, Limited, in succession to Mr. H. H. HICKS who has relinquished the position after 30 years' service with the company.

Mr. J. S. BAILLIE, deputy chairman of Harland & Wolff, Limited, has been appointed to the boards of A. & J. Inglis, Limited, and of D. & W. Henderson & Company, Limited, in place of Mr. J. R. LEE, who has resigned on account of ill-health.

Mr. A. J. W. GREEN, who recently joined the board of Frederick Braby & Company, Limited, has been appointed joint managing director. Mr. Green is a director of Auto Diesels, Limited, which was acquired by Frederick Braby in October last.

Acme Conveyors, Limited, Acme Chambers, 1, Bradford Street, Walsall, Staffordshire, announce the appointment of Mr. J. BOYD BLAKEBOROUGH, M.A. (Cantab), M.I.C.E., M.I.MECH.E., as joint managing director with effect from January 5.

Mr. K. S. PEACOCK has relinquished his position as joint managing director of Guest Keen & Nettlefolds (South Wales), Limited, but remains chairman. Mr. N. R. R. BROOKE, formerly a joint managing director, has been appointed sole managing director.

Mr. ROBERT W. YOUNG has been appointed chairman of Moler Products, Limited. Mr. WILLIAM J. SHAW and Mr. RALPH D. HART have been appointed joint managing directors. Mr. ROBERT WOOD, chairman and managing director, has retired from the company.

Mr. RALPH HOLLAND retired at the end of last year after 32 years' service with Sagar-Richards, Limited, Luddendon Foot, Halifax. He has been manager of the machine shop for the past two years, and was previously manager of the machine shop at Cooper House.

Mr. CHARLES PULLAN, sales director of Armstrong Whitworth (Metal Industries), Limited, and Jarrow Metal Industries, Limited, has retired from executive duties after 30 years' association with these companies. He remains on the board of directors in a consultative capacity.

Monsanto Chemicals, Limited, announce the appointment of Mr. W. H. RITCHIE as development manager—projects, and of Mr. N. G. H. THOMAS as development manager—products. Mr. Ritchie and Mr. Thomas will both be responsible to Dr. J. A. Gardner, controller of development.

Mr. MICHAEL D. CLAPHAM, a joint managing director of Imperial Chemical Industries, Limited, metals division, has been appointed chairman of the division. He succeeds Dr. MAURICE COOK, who has retired from the company's service. Mr. G. A. D. SMITH has been appointed commercial managing director of the division.

Sir JOHN CHARRINGTON has relinquished his position as managing director of Charrington, Gardner, Locket & Company, Limited, but will continue as chairman. Mr. K. M. STOBART has been elected vice-chairman. Mr. Stobart, Mr. H. D. B. LORRAINE and Mr. JOHN CHARRINGTON have been appointed managing directors and Mr. C. P. HUMPHRIS has joined the board.

Mr. W. H. WENTWORTH PING, sales development manager, Firth-Vickers Stainless Steels, Limited, Sheffield, has been appointed general sales manager, for co-ordinating the sales departments of all branches of the company's business. Mr. A. G. CLEGHORN, superintendent of the polishing works of the company, has been appointed assistant general manager, Blackheath Works.

Mr. J. J. SHEPPARD of Melton Mowbray, Leics., retired recently after 39 years in the foundry industry. For four years he was with Stanton Ironworks Company, Limited, and for the past 35 years was with the Holwell Ironworks branch. It is reported that he was the man to carry the first ladle of iron to the firm's experimental spinning unit. The company is now world-famous for its spun plant products.

Mr. F. C. WRIGHT, managing director of Standard Telephones & Cables, Limited, and Mr. JOHN GRIMSTON, managing director of Enfield Cables, Limited, and Enfield Rolling Mills, Limited, will alternate as chairman of the newly-formed Enfield-Standard Power Cables Company which will handle the merged power cable businesses of Enfield and STC. Mr. E. C. Lee will be general manager of the new company.

Mr. W. J. RUSTON has been elected chairman of Davey Paxman & Company, Limited, in the place of Mr. HAROLD RIGGALL, who has resigned from the board on his retirement from the managing directorship of the parent company, Ruston & Hornsby, Limited. Mr. V. R. PREHN has been elected deputy chairman in succession to Sir PERCY SANDERS, who has resigned for

health reasons, but remains a member of the board.

Mr. W. S. RICHARDS has been appointed managing director of Brightside Heating & Engineering Company, Limited, of which he has been director for some years. Mr. R. IVOR SLATER, has resigned from the position of secretary of Brightside Engineering Holdings, Limited, on his appointment as managing director of Moorwoods, Limited. Mr. JAMES R. NUTTALL has been appointed secretary of Brightside Engineering Holdings, Limited.

Mr. R. P. WALLACE, managing director of Jessop-Saville, Limited, Sheffield, presented Mr. ARTHUR MILLS, export manager, with a car radio from his colleagues, to mark his retirement after 50 years in the steel trade and 46 with the firm. Mr. Wallace said Mr. Mills was the salesman who had brought the company's war-end lull to a very successful peak. During the war Mr. Mills was with the Ministry of Supply, specializing in high-speed steels.

Dr. J. G. PEARCE, C.B.E., has been appointed as a consultant to the alloys division of Union Carbide, Limited, London, and will work in collaboration with Dr. A. M. SAGE and his team in their development programmes. Mr. G. V. JONES, A.I.M., formerly of A.P.V.-Paramount Company, Limited, has joined the development department of the division where he will mainly be concerned with the developments associated with the cast-iron industry.

Obituary

Mr. JOHN WILLIAM DAVIES, a former works director of Ferranti, Limited, Hollinwood (Lancs), has died at the age of 79. Mr. Davies joined the firm, in the tool-room, in 1898, and in 1924 after being foreman and departmental works manager, he became general works manager. He was elected to the board in 1942. He was a past-president of the Manchester branch of the Engineering Employer's Association, and a founder-member of the institution of Production Engineers.

The death has occurred at the age of 76 of Mr. ARTHUR FORSHAW, M.SC., who from 1924 until his retirement in 1952 was chief chemist of R. & A. Main, Limited, gas-stove manufacturers. After service as chief chemist with John Wright & Company, Limited, and Fletcher Russell & Company, Limited, he became, in 1923, chemist to, and convenor and secretary of, the Institution of Gas Engineers committee on standard methods of testing gas ovens. He was for many years a member of the Council of the Gas Research Board, and of the engineering divisional Council of the British Standards Institution.

THE MANUFACTURING AND MARKETING in the United Kingdom of Surform and Surcut surfacing and cutting tools was transferred from Simmonds Aerocessories, Limited, to Firth Cleveland Tools, Limited, on January 1; both companies are members of the Firth Cleveland group. The home sales office will continue to be at Stornoway House, Cleveland Row, London, S.W.1. Export sales will continue to be handled from Stornoway House by Simmonds Aerocessories, Limited, as selling agents, and distribution in Sweden, Denmark, Holland, Belgium, Germany and Italy will continue under the control of subsidiaries in those countries. Other local agencies will remain unaltered. Consequent upon these changes, Mr. C. W. Clarke has been appointed general sales manager of the Surform Division of Firth Cleveland Tools, Limited, and Mr. E. Cragg has been appointed home sales manager of the sales division.

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News in Brief

RHODEN PARTNERS, LIMITED, have removed from Park Crescent, London, W.1, to larger premises at 19 Fitzroy Square, London, W.1 ('phone: EUS 9696).

WALKER, CROSWELLER & COMPANY, LIMITED, Cheltenham, announce that they have reduced the price of Unataps, which are largely used in factory washrooms.

INDUSTRIAL PUMPS, LIMITED, of 20, Bentinck Road, Hyson Green, Nottingham, has opened a new branch office and depot at 62A, Station Road, Kings Langley, Hertfordshire. Mr. John Davidson is manager of the depot.

A PRELIMINARY REQUEST has been issued for members of the Institute of Metals to submit photomicrographs for exhibition during the symposium on metallographic techniques, which is to be held in London on Thursday, April 7.

BRIGHTSIDE FOUNDRY AND ENGINEERING COMPANY, LIMITED, Sheffield, has received a contract for the supply of about 2,500 tons of plate-mill finishing equipment for the new plate mill of the Consett Iron Company, Limited.

ORDERS WORTH NEARLY £700,000 for electrical equipment for Australian rolling mills have been obtained by the heavy plant division of Associated Electrical Industries, Limited, Rugby, from Australian Electrical Industries Pty., Limited.

WILLIAM JOHNSON & SONS (LEEDS), LIMITED, Castleton Foundry, Armley, Leeds, celebrates its centenary this year. The firm was founded by the late Mr. William Johnson to serve the general crushing- and grinding-machinery markets.

A 102-TON ARMATURE has been made by Associated Electrical Industries, Limited, for the Northern Aluminium Company, Limited, at Rogerstone. Part of a 4,000 h.p. motor, it is the heaviest and most powerful electric-motor armature to be despatched from the Rugby works.

ALDERMAN A. V. WOLSTENHOLME, Lord Mayor of Sheffield, presented long-service awards of watches or clocks to 51 employees of Firth Brown Tools, Limited, Sheffield, at the works on January 4. They included three men with 47 years' service, five with 46 and three with 45.

LORD KNOLLYS, chairman of the English Steel Corporation, Limited, Sheffield, was present at the firm's annual staff dance at the Cutlers' Hall on January 8. There were nearly 1,000 people present. Other directors there included Admiral Sir Michael Denny, Mr. R. W. Johnson and Colonel A. T. Maxwell.

BRIGHTSIDE HEATING AND ENGINEERING COMPANY, LIMITED, Sheffield, has supplied all the engineering services for the new hospital at Ahmadi, near the shores of the Gulf of Arabia, centre of the Kuwait Oil Company, to be opened by the Sultan of Kuwait on April 12. The order was worth £600,000.

A NEW factory which will open in Frimley, near Camberley (Surrey), during the next few weeks, will be occupied by Dymet Alloys, Limited, of Croydon, specialists in production and manipulation of tungsten carbide. Dymet is a subsidiary of Rockweld, Limited, and the parent company will move in later this year.

THE SPEAKER at the January luncheon meeting of the Non-Ferrous Club was Commander Douglas Lichfield-Merry who gave an account of his experience as a Naval frogman during and after the war. At this luncheon, a collection taken on behalf of the Royal Metal Trades Pension and Benevolent Society, realized the sum of £18 10s.

EMPLOYEES, members of their families, and friends, were present at the first dinner/dance of Sterling Foundry Specialities, Limited, London-road, Bedford, since the company was founded in 1920. Mr. J. G. W. Lowe, managing director, spoke of the company's activities during 1959 and anticipated increased production during 1960.

SHEFFIELD TRADES AND LABOUR COUNCIL and Sheffield Confederation of Shipbuilding and Engineering Unions have communicated with Sheffield Chamber of Commerce about the promotion of a Sheffield Trade Fair. It is hoped that a joint meeting of representatives will take place and that when the scheme was implemented it would have the help of the City Council.

SHEFFIELD HEALTH COMMITTEE has recommended that notices be served on 49 owners of houses in the central smoke-control area requiring them to carry out necessary adaptations within 28 days of the receipt of notice, to make the premises comply with the provisions of the Smoke Control Order. This is the first time Sheffield has taken such a step.

CRANE CONTROLS valued at nearly £60 000 have been ordered from Brookhirst Igranic, Limited, a Metal Industries group subsidiary, by Joseph Adamson & Company, Limited, of Hyde, Cheshire. The controls will be installed in two hot-metal ladle cranes and 12 overhead-travelling cranes which Joseph Adamson is supplying to the Steel Company of Wales, Limited.

A TURBINE GENERATOR for the Thorpe Marsh Powerstation, under construction near Doncaster, is to be built by Associated Electrical Industries, Limited, at a cost of about £3.750.000. It is reported that it will be the largest of its type in the world. The design and manufacture of the generating set will be carried out at the Trafford Park works of the AEI (turbine-generator division) in Manchester.

MANUFACTURE AND SALE of ship's propellers and other marine products will be undertaken by a new company formed by Stone-Platt Industries, Limited. The new subsidiary, J. Stone & Company (Propellers), Limited, will take over business formerly carried on by J. Stone & Company (Charlton), Limited. Other business carried on by J. Stone & Company (Charlton) will continue exactly as before.

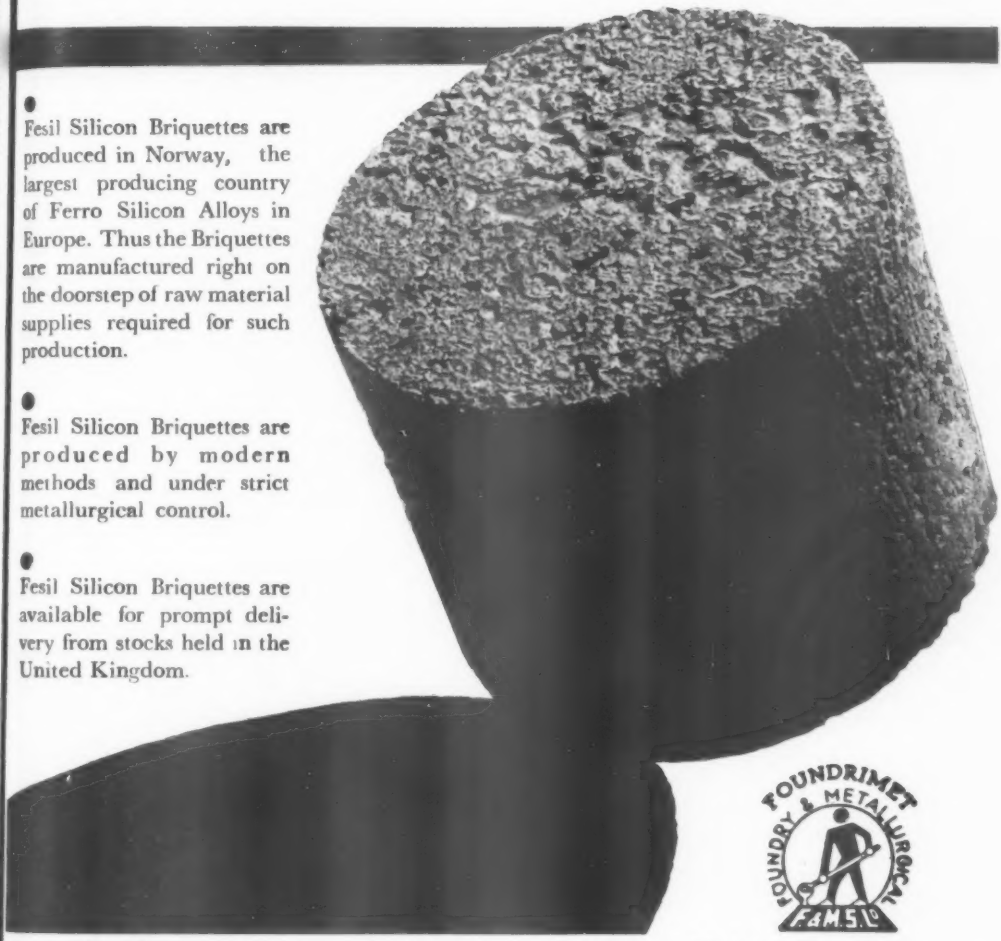
IT IS ANNOUNCED that Nash & Thompson, Limited, have acquired a second factory at Hook Rise, Tolworth, within 200 yards of their present research and production unit in Oakcroft Road, Chessington, Surrey. This new factory has increased the available space by 35,000 sq. ft., and the transfer of administrative departments, research and development, and some production departments has now been completed.

ELECTRIC RESISTANCE FURNACE COMPANY, LIMITED, has received an order from the United Kingdom Atomic Energy Authority for furnaces for the heat-treatment of nuclear fuel elements. The order, valued at over £15,000, covers the supply of six Efco-Lindberg furnaces fitted with external forced-convection heating units. The company has already supplied 12 furnaces of the same type for the same process.

THE PAKISTAN GOVERNMENT has placed an order for 88 Challenger diesel-crawler tractors, worth approximately £350 000, with John Fowler & Company (Leeds), Limited, engineers, Leeds, a member of the Marshall organization. The order was obtained in face of competition from the United States, Italian, French, German and Russian tractor-manufacturers among others. The tractors will be built at the firm's Hunslet Works, Leeds.

(*Continued on page 60*)

FESIL SILICON BRIQUETTES



- Fesil Silicon Briquettes are produced in Norway, the largest producing country of Ferro Silicon Alloys in Europe. Thus the Briquettes are manufactured right on the doorstep of raw material supplies required for such production.

- Fesil Silicon Briquettes are produced by modern methods and under strict metallurgical control.

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MANUFACTURERS OF MANGANESE, SILICO-MANGANESE AND OTHER FERRO ALLOY BRIQUETTES

News in Brief

(*Continued from page 58*)

THE GENERAL PRODUCTS group of the General Electric Company, Limited, has been reorganized and five new groups have been formed, each under the control of a group managing director. The new groups (with the managing directors' names in parentheses) are:—Domestic equipment (Mr. E. A. Fowler); installation equipment (Mr R. H. Phillips); lighting and heating (Mr. D. L. Tabraham); Osram (Mr. A. E. Page); radio (Mr. M. M. Macqueen).

FORMED TO ACQUIRE all or part of the business of James Booth & Company, Limited, Birmingham, which consists of the manufacture of wrought aluminium and aluminium products, James Booth Aluminium, Limited, has an initial capital of £100. James Booth & Company is a subsidiary of the Delta Metal Company, Limited, London, S.E.10, which has been negotiating with US Kaiser interests on arrangements for mutual trading and development.

IN CONNECTION with their design of independent blast-heater for cupolas, Incandescent Heat Company, Limited, report that they have now installed, or have orders for, nine of these units, the smallest for a furnace of one-ton per hr. and the largest for one of 10-tons per hr. capacity. The most recent orders have been received from India and Austria in the face of considerable competition; the latter being a direct result of showing at the Bingley Hall Exhibition held in May, 1959.

LEYLAND MOTORS, LIMITED will shortly operate its own private aircraft for the use of the company's directors and senior executives. The aircraft bought by the company is a six-seater twin-engined De Havilland Dove, which can travel at over 200 m.p.h. and has a maximum range of nearly 900 miles. A resident pilot will captain the plane and De Havilland engineers will undertake its servicing. Closest airfield to Leyland's Lancashire headquarters is only eight miles away, at Salmesbury.

The first public conference to explain the various functions of "the City" is to be held in London on February 23 and 24. Organized by the Industrial Welfare Society, it is aimed at providing a clear understanding of how this vital section of the national economy works, and to suggest ways in which financial knowledge may be spread more generally through all levels of management to the office and the workshop. Details are available from the Society, Robert Hyde House, 48, Bryanston Square, London, W.1.

AN AGREEMENT HAS BEEN CONCLUDED between Kelvin & Hughes, Limited, and the Curtiss-Wright Corporation of America for the exclusive right to manufacture and sell the non-destructive testing equipment of the other partner. This includes instruments for the inspection and measurement of materials, and equipment employing ultrasonic techniques in all industrial fields. Kelvin Hughes will represent both interests in the UK, the Commonwealth (except Canada) and Europe, and Curtiss-Wright in the USA and Northern America.

A FILM entitled "Infra-red Heat in Industry" is available from the General Electric Company, Limited. The film explains what infra-red heat is and shows in interesting fashion its applications to industrial processes such as plastics, paint stoving and nylon setting. The film is a 16 mm. colour sound film for projection at silent speed and has a running time of 18 minutes. Applications for the free loan of the film should be made to the industrial heating department, GEC, Magnet House, Kingsway, London, W.C.2.

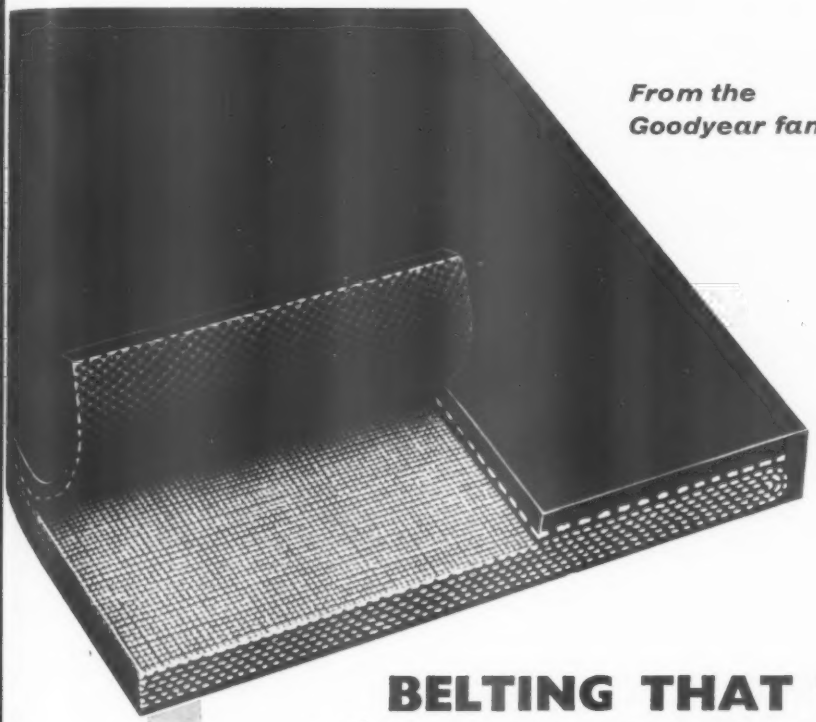
AT A RECENT MEETING of the Birmingham Chamber of Commerce, the problem of trade barriers raised by some Commonwealth countries was again discussed, and it was revealed that the Birmingham Chamber has persuaded the Association of British Chambers of Commerce to undertake a study of the problem. The Association has agreed to ask for a full debate on the issue at the Congress of Commonwealth Chambers, to be held in Canberra, Australia, in April. Mr. J. Masterton, of Joseph Lucas, Limited, has been delegated to represent the Birmingham Chamber.

THE INITIAL PART of a £100,000 contract has been awarded to a British firm, E. G. Irwin & Partners, Limited, design, development and consulting engineers, for a materials-handling plant, to be built in Northern Spain. The contract is exclusive of the building and civil work necessary. The Spanish steel concern, Ferroaleaciones Y Electrometales S.A., of Santander, has placed the contract for conveyors, bunkers, elevators and the transportation system of a ferromanganese and ferrochrome plant which will be commissioned by the end of 1960. The main contractors are Mecanica de la Pena S.A. of Bilbao.

FUEL AND METALLURGICAL PROCESSES, LIMITED, announce that they have acquired the total issued share capital of the Furnace Construction Company, Limited, of Birmingham. As a result of this merger, Mr. D. H. Evans, Dr. G. J. Shaw, Mr. C. A. Bone, and Mr. J. F. Sadler have joined the board of the latter company. Mr. A. H. Preedy, in addition to remaining as managing director of the Furnace Construction Company, has joined the board of Fuel and Metallurgical Processes, Limited. The offices of both companies will be temporarily at Normanhurst Chambers, St. James' Road, Dudley, Worcs.

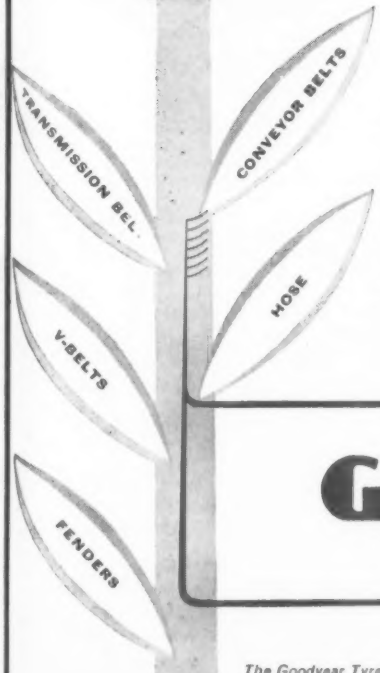
AT APPLEBY-FRODINGHAM STEEL COMPANY, Scunthorpe, on December 21, Mr. A. Bridge, ironworks engineer, lit the Queen Mary furnace, thought to be the first ever to have a complete stack lining of sillimanite. This lining was supplied by General Refractories, Limited, of Sheffield, in Sillmax "1" quality—in bondless brick form. It is claimed that this refractory has excellent physical properties, including high density, low porosity, high resistance to abrasion and spalling, volume stability at all temperatures likely to be encountered in the lower stack, and high resistance to molten slag, metal, and alkali vapour. The results attained from this lining, it is expected, will be of great interest to iron makers throughout the world.

AT A SPECIAL LUNCHEON, held in Birmingham on January 8 by the Midland branch of the Institute of Directors to celebrate the passing of the 3,000 mark in membership. Sir Richard Powell, director general of the Institute, paid tribute to Mr. Guy M. Chantrey, who has been chairman of the branch since 1949 when membership stood at about 65. The Midland branch is the largest in the Institute, and Sir Richard said that Mr. Chantrey had become known at national headquarters as "Mr. 10 per cent." because of the consistency with which he held the Midland branch membership at one tenth of the total for the whole country. Major General Sir Edward Spears, chairman of the national Council of the Institute, said that there was now general recognition in industry that employees must be looked after in the provision of security, rewards in old age, safety and adequate returns for labour, but few people were thinking of the men who provided the work and that they, too, should be similarly considered. Among other speakers was Mr. Gerald Nabarro, M.P. for Kidderminster, who said that just as the trade unions should be efficient, so too, should the "bosses."



From the Goodyear family tree

BELTING THAT TAKES A LOT OF BEATING



Whatever material you want to move, whatever the conditions, you'll find the conveyor belt for the job in the Goodyear family tree! For abrasive coke or hot sinter . . . oily materials or sharp stone . . . food and coal . . . a 'job-designed' Goodyear belt is your best choice for longest, low-cost performance. Special features include: good troughing, high impact resistance and flex life, and resistance to mildew. Get in touch with Goodyear now for Britain's most comprehensive conveyor belt service.

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- Breaker fabric between cover and carcass—where required
- Plies of close-woven cotton duck, or synthetic fibres, mildew inhibited
- Skim coat between plies to increase flexibility, prevent separation
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GOODYEAR

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The Goodyear Tyre & Rubber Company (G.B.) Ltd., Industrial Rubber Products Dept., Wolverhampton

Raw Material Markets

Iron and Steel

Many sections of the ironfounding industry began the New Year with good prospects, and are assured of a continuation for some time ahead of production of castings at least at recent substantial levels. This applies particularly to those catering chiefly for the motor vehicle trade, general engineering, and the steelworks. Other industries are calling for increased quantities of high-duty castings, including the machine-tool makers whose requirements continue on an upward trend. From railways and collieries the call for castings is still moderate.

Overall the engineering and speciality foundries are well occupied on present available business and outputs of castings are at high levels. Many of the light foundries are also able to maintain the improvement in their production on account of the continued increased demand for household equipment and most of the jobbing foundries are fairly well employed. The textile foundries, however, could do with more work.

Production of pig-iron continues to expand as bigger demands come from the steelworks for basic pig-iron and, from the engineering and speciality foundries, for low-phosphorus iron and hematite. For these grades there is more forward buying. The steelworks are taking up substantial tonnages of basic pig-iron, consumption of which is likely to increase owing to the scarcity of scrap.

In the foundry grades of pig-iron there is a sustained heavy demand from the engineering and speciality foundries for the low-phosphorus irons. Some brands of this iron continue scarce, but, overall, outputs from the several sources of supply appear to be adequate. Present needs will be more easily met as increased furnace capacity comes into operation within the next few weeks.

Hematite makers are much busier, outputs having been stepped up considerably to satisfy the needs of the steelworks for ingot moulds and castings. Refined iron producers are also busier.

From the light and also some of the engineering foundries increased calls continue for the high-phosphorus pig-iron, but producing furnaces are able to satisfy them without difficulty. Increased business could be undertaken to absorb fully stocks and current outputs. The excess tonnages are, however, being reduced to some extent by the orders which continue to be received from buyers abroad.

There is a keen demand from the foundries for arisings of suitable cast-iron and steel scrap, particularly in the better and heavier grades of cast iron which are scarce. Foundry coke deliveries are up to the present satisfactory, and ganister, limestone, and firebricks are readily available.

The re-rollers are well provided with orders for all their products. There is a sustained heavy demand for small bars and light sections, as well as for reinforcing rods, and the orders on hand ensure capacity outputs for some time ahead—providing adequate supplies of steel semis can be secured. Deliveries of billets, etc., from home steelworks are at present below requirements and most re-rolling establishments are working hand-to-mouth on the supplies coming forward, as very little if any stock is held by them in the various analyses and sizes required. On account of their own needs the steelworks are limited in the tonnages available for distribution and many orders from the re-rollers are badly in arrears, while fresh business is difficult to place. All arisings at the steelworks of suitable re-rolling quality defectives and crops are readily accepted.

Non-ferrous Metals

Settlement of the eight-month old steel dispute in the US last week prompted a rash of optimistic economic forecasts for 1960 and these two factors have played a major part in putting non-ferrous metal markets on a firmer basis on both sides of the Atlantic.

Tin benefited most—and rightly so—as the US steel industry uses some 30,000 tons of tin a year in the production of tinplate. Prior to the settlement, tin prices had been falling both in London and in New York, but after the settlement had been announced the cash price in London rose eight points to £793 10s. a ton before dropping back in heavy trading conditions, believed to be due to buffer stock selling.

The outlook is now much improved, although a recent estimate of the statistical position for the metal concludes that production may outrun consumption by as much as 14,000 tons this year. If this proves to be so, it will place the International Tin Council in the embarrassing position of having to cut back export quotas once more. Consumer interest in the US is increasing and the price has moved up to around $1.00 a pound.

Zinc, which has been a good market on both sides of the Atlantic, also received a fillip from the settlement and the US price of special high-grade electrolytic has been raised to 14½-14¾ cents a pound with "Prime Western" zinc, East St. Louis, being quoted now at 13 cents, compared with 12½ cents a pound previously. The only other item affecting this market has been the news that the study group of the United Nations will meet in Geneva on January 27 to discuss the world position and prospects for the production/consumption of zinc and lead. Lead is also an improving market in both London and in New York, where the price is firmer at 12 cents a pound.

Copper is a good market in London. Demand is good and the backwardation in London has now closed to around £7 a ton, which compares with £16 a ton earlier. The US position is unchanged in that only Kennecott of the big producers has come to terms with the Mine, Mill and Smelter Workers' Union, with the important exception of its big property in Utah. News from the other two major producers, Phelps Dodge and Anaconda, is not cheering; Anaconda has broken off negotiations with the union and nothing has been heard from Phelps Dodge. It may well be that a settlement in the US copper industry will be more difficult now because it is rumoured that the steelmen received a great deal more by way of wage rises than the Mine, Mill and Smelter Workers' Union members who have already come to terms with Anaconda and the American Smelting & Refining Company.

The US price structure is unchanged, with custom smelters quoting 35 cents and producers 33 cents a pound. The outlook in London is good, as there will definitely be a shortage of physical copper for some months ahead and present price levels must be at or near realistic levels.

Forthcoming Events

(Continued from p. 36)

JANUARY 23

Institute of British Foundrymen

Northampton section: "Introduction to Patternmaking in Plastics," by H. G. C. King, 6 p.m., at the Hind Hotel, Wellingborough.

East Midlands branch: "Precision in Casting," by A. Sheat, 6 p.m., at the College of Arts, Derby.

Lancashire branch: Annual dinner/dance at the Grand Hotel, Manchester.

West Riding of Yorkshire branch: "Light-alloy Castings," by T. A. Williams, 6.30 p.m., at the Bradford Institute of Technology.

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Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

January 13, 1960

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £24 14s. 0d.; Scotland (Scotch iron). Zone S.1, £25 0s. 6d.; Sheffield, £26 2s. 6d.; Birmingham, £26 9s. 0d.; Wales (Welsh iron), £24 14s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £41 10s. 0d. to £44 0s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £57 0s. 0d. to £62 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 11s. 10d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 14s. 10d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £78 10s. 0d. to £82 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 28s. 6d. per unit; over 6 per cent. C, £77 0s 0d. to £80 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 28s. 6d. per unit; 2 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 1 per cent, C,* 1s. 8½d. to 1s. 11½d. per lb. Cr; 0.15 per cent. C,* 1s. 9½d. to 2s. 0½d. per lb. Cr; 0.10 per cent. C,* 2s. 0½d. per lb. Cr; 0.06 per cent. C.* 2s. 1d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £245 0s. 0d.; 96/98 per cent., £275 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £63 10s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons, £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. SIEMENS MARTIN ACID (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

* Average 68-70 per cent.

FINISHED STEEL

Heavy Plates and Sections (under 10 tons).—Ship plates, (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E. Coast), £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. 0d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £68 5s. 0d.

Alloy Steel Bars.—1 in. dia. and up; Nickel, £68 10s. 0d.; nickel-chrome, £99 4s. 0d.; nickel chrome-molybdenum, £111 17s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £255 10s. 0d. to £256 0s. 0d.; three months, £245 0s. 0d. to £245 10s. 0d.; settlement, £256 0s. 0d

Copper Tubes, etc.—Solid-drawn tubes, 2s. 5½d. per lb.; rods, 275s. 0d. per cwt. basis; 20 s.w.g., 310s. 0d. per cwt.

Tin.—Cash, £789 10s. 0d. to £790 0s. 0d.; three months, £786 10s. 0d. to £787 0s. 0d.; settlement, £790 0s. 0d.

Lead (Refined Pig).—First half January, £75 0s. 0d. to £75 2s. 6d.; first half April, £74 15s. 0d. to £74 17s. 6d.

Zinc.—First half January, £94 15s. 0d. to £95 0s. 0d.; first half April, £91 10s. 0d. to £91 16s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £130 10s. 0d.; rolled zinc (boiler plates), all English destinations, £128 5s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £107 10s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 2s. 0½d. per lb.; sheets to 10 w.g., 217s. 9d. per cwt.; wire, 2s. 9½d.; rolled metal, 217s. 9d. per cwt.

Brass (Brazing).—BS1400, B3, £165; B6, £219.

Brass (High Tensile).—BS1400, HTB1, £195; HTB2, £215; HTB3, £227.

Gunmetal.—BS1400, LG2, £208; LG3, £217; G1, 1½%, £273; G1, 1%, £260.

Phosphor Bronze.—BS1400, PB1 (AID released), £308; BS1400, 90/10/1, £290.

Leaded Phosphor Bronze.—BS1400, LPB1, £227.

Phosphor Bronze Strip, etc.—Strip, 308s. 9d. per cwt.; wire, 4s. 3½d. per lb.; rods, 3s. 6d.; tubes, 3s. 6d.; chill cast bars; solids 3s. 5½d.; cored 3s. 6½d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide x 0.056, 3s. 11½d. per lb.; round wire, 10g in coils (10 per cent.), 4s. 4½d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 4s. 3½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 0d. to 2s. 3d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £71 10s. 0d. to £72 0s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £186 0s. 0d.; aluminium bronze (BS1400), AB1, £254; AB2, £264.

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Imports and Exports of Iron and Steel in November

The following tables, based on Board of Trade returns, give figures of imports and exports of iron and steel in November, 1959. Totals for the first 11 months of 1959 and 1958 are also included.

Total Exports of Iron and Steel

Destination.	Month ended Nov.30.	Eleven months ended November 30.	
	1959.	1958.	1959.
	Tons.	Tons.	Tons.
Cyprus	184	5,042	1,523
Sierra Leone	175	11,311	8,718
Ghana	1,541	14,253	24,058
Nigeria	3,704	63,663	67,894
Union of South Africa	4,221	98,216	38,316
Rhodesia and Nyasaland	1,647	30,575	19,371
Tanganyika	1,160	13,798	17,808
Kenya	2,362	37,420	23,783
Uganda	190	2,885	3,905
Mauritius	179	3,188	1,599
Aden	125	2,677	2,833
Bahrein, Qatar, and Trucial States	1,212	8,583	7,769
Kuwait	375	37,461	9,528
India	24,434	134,801	191,676
Pakistan	4,755	50,138	41,106
Singapore	2,067	31,004	20,872
Malaya	974	14,463	9,573
Ceylon	1,278	28,550	34,124
British North Borneo	241	1,862	2,510
Hongkong	6,785	53,590	62,137
Australia	10,589	96,324	78,734
New Zealand	12,275	174,259	94,152
Canada	40,037	173,283	215,097
Jamaica	1,892	19,786	19,945
Trinidad	2,543	46,215	37,060
British Guiana	612	6,359	6,085
Other Commonwealth countries	3,917	42,441	33,970
Eire	5,397	44,808	45,279
Soviet Union	1,113	18,924	29,713
Finland	4,124	45,993	34,385
Sweden	13,612	111,337	117,625
Norway	11,219	85,068	89,277
Denmark	8,692	77,546	87,288
Western Germany	6,697	52,211	108,377
Netherlands	12,627	73,858	93,093
Belgium	2,134	36,660	33,082
France	244	3,978	5,285
Switzerland	569	8,650	7,882
Portugal	1,055	12,874	13,863
Spain	966	40,291	24,700
Italy	2,361	37,761	42,409
Austria	822	8,712	4,263
Yugoslavia	887	4,014	5,168
Greece	356	11,875	9,964
Turkey	36	4,093	4,746
Netherlands Antilles	136	1,961	3,091
Portuguese East Africa	117	2,501	1,368
Egypt	2,940	12,410	6,148
Sudan	407	31,479	6,508
Lebanon	216	8,644	3,270
Israel	462	8,194	12,774
Saudi Arabia	51	3,808	3,000
Iraq	4,178	37,937	73,084
Iran	3,652	36,764	36,086
Burma	480	10,933	8,062
Thailand	140	6,469	7,375
Indonesia	2,438	2,119	8,315
Philippine Republic	1,383	3,396	8,142
USA	21,274	79,915	180,552
Cuba	1,267	5,724	7,407
Colombia	1,198	5,147	4,903
Venezuela	3,032	60,507	61,460
Ecuador	48	2,235	896
Peru	502	9,503	2,725
Chile	127	4,699	1,363
Uruguay	253	848	1,745
Argentina	3,790	119,769	184,528
Other foreign countries	42,814	136,336	322,457
TOTAL	293,290	2,472,088	2,775,804

Total Imports of Iron and Steel

From	Month ended Nov. 30.	Eleven months ended November 30.	
	1959.	1958.	1959.
	Tons.	Tons.	Tons.
Rhodesia and Nyasaland	471	5,627	4,884
Canada	2,689	20,350	18,140
Other Commonwealth countries and Eire	6,710	20,529	38,520
Soviet Union	15,424	108,945	59,930
Sweden	2,891	31,971	27,840
Norway	10,065	64,514	81,330
Poland	511	319	4,672
Western Germany	7,304	62,782	70,186
Netherlands	16,754	136,559	151,209
Belgium	1,558	87,465	20,475
Luxembourg	687	6,007	6,222
France	3,599	17,503	22,092
Italy	706	7,026	12,334
Austria	302	3,770	3,776
Japan	229	3,151	2,227
USA	2,565	115,110	23,284
Other foreign countries	1,538	7,348	11,340
TOTAL	74,003	698,976	558,591
Iron and steel scrap and waste, fit only for the recovery of metal	174	62,864	2,677

Exports of Iron and Steel, by Products

Product.	Month ended Nov. 30.	Eleven months ended November 30.	
	1959.	1958.	1959.
	Tons.	Tons.	Tons.
Pig-iron	7,422	134,991	125,875
Ferro-columbium (niobium)	7	34	82
Ferro-tungsten	119	804	1,110
Other ferro-alloys	1,800	3,296	9,002
Ingots, blooms, billets, slabs, sheet bars (incl. tinplate bars), and similar primary forms	3,136	16,503	74,760
Pieces roughly shaped by forging*	210	6,718	1,334
Iron bars, rods, angles, shapes, and sections	146	1,611	3,323
Steel bars, rods, angles, sections, and shapes	73,688	305,048	476,785
Iron plates and sheets	110	1,695	1,642
Universal plates	970	4,283	8,758
Steel plates, 3mm. and under 4.5mm. thickness	2,299	8,067	37,049
Ditto, 4.5mm. or more in thickness	26,282	160,092	197,160
Blacksheets and blackplate	28,230	264,520	259,182
Hoop and strip	6,677	71,882	76,030
Tinplate	33,770	364,282	423,177
Decorated tinplate	530	5,604	7,628
Galvanized sheets	5,071	77,345	76,982
Other (incl. tinned sheets, terneplate, and ternesheets)	2,406	12,484	19,842
Railway and tramway construction material	12,798	222,742	153,642
Wire rods of steel (incl. alloy steel)	4,277	45,351	45,428
Wire	10,843	93,672	99,695
Tubes, pipes, and fittings	72,499	671,064	677,340
TOTAL	293,290	2,472,088	2,775,804

* The figures for 1959 are not completely comparable with those for previous years.

KINCAID & COMPANY, LIMITED, Greenock, are to supply the machinery for a £1,000,000 bulk carrier to be built by Short Brothers, Limited, Sunderland. The vessel, of 19,500 tons, ordered by a Norwegian firm, is to be delivered in 1961.

MR. G. W. SMALES, assistant secretary of Cochrane (Middlesbro') Foundry, Limited, has been appointed deputy general manager. He will continue as assistant secretary.

HISTORICAL NOTE

W. J. Mariner & Co. Ltd., of Luton were established in 1909 and have just completed 50 years as Non-Ferrous Founders. They produce castings of very varied types and sizes both in Aluminium and Bronze for all classes of Engineering, and also manufacture very largely for the hatting industry. They are A.I.D. approved.

Baker Perkins Foundry Machinery at work . . . *at W. J. Mariner & Co. Ltd.*

This Turbo 60 Rotating Drum Airless Shot Blast Machine has been installed in the foundry of W. J. Mariner & Co. Ltd., Luton. The Turbo 60, with its effective load of up to 132 lb. and an output of up to 15 cwts. an hour, is easy to maintain and gives high performance at low cost.

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Advertisements (accompanied by a remittance) and replies to Box Numbers should be addressed to the Advertisement Manager, Foundry Trade Journal, John Adam House 17/19, John Adam Street, Adelphi, London, W.C.2. If received by first post Monday advertisements can normally be accommodated in the following Thursday's issue.

SITUATIONS WANTED

FOUNDRY SUPERINTENDENT, Australian, 29, with wide experience in Australian malleable, grey iron and electric steel founding industry, together with US experience, seeks management position in UK in similar industry. Box FS307, FOUNDRY TRADE JOURNAL.

WORKS or FOUNDRY MANAGER, age 39, requires position where integrity, initiative and ability to produce first class results will be appreciated. Considerable experience. Practical Technical, commercial and metallurgical training. Floor, mechanised plant, CO, and Shell. Diploma Foundry Practice & Technology. A.M.I.Prod.E., M.I.B.F. Genuine replies only please. Interviews welcomed. Reply Box WF314, FOUNDRY TRADE JOURNAL.

FOUNDRYMAN 43 years M.I.B.F. 15 years Managerial Experience Production of High Duty C.I. and Non Ferrous Castings Machine Tool, Marine and General. Fully conversant Estimation, Cupola and Sand Control, CO., Air Set, Shell Moulding, etc., 6 years experience abroad. Consider any Genuine offer U.K. or abroad. Box FO340, FOUNDRY TRADE JOURNAL.

COST/WORKS ACCOUNTANT seeks appointment February 1st. Twenty years' experience foundry engineering. Good methods adviser. Box CW332, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

DESIGN DRAUGHTSMEN required by well known Foundry Equipment Manufacturers in Manchester area. Good prospects and ideal working conditions. Box DD336, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

AGENT, able to expand existing connection, wanted for London and Home Counties by Midland Ironfounders specialising in repetition grey iron castings for the light engineering and electrical trades. Commission basis. Full particulars to Box AG339, FOUNDRY TRADE JOURNAL.

WANTED. A practical ROLLMAKER to take complete charge of a Roll Foundry making Straight Carbon, Molybdenum and Indefinite Chill Rolls also Hollow Rolls. Reply giving full particulars of experience and qualifications also stating salary required. Box AP309, FOUNDRY TRADE JOURNAL.

ASSISTANT FOREMAN required for non-ferrous foundry near London. Mainly copper-based alloys. Sound practical experience essential. Willingness to learn, to accept responsibility and to keep good time even more essential. Salary and prospects good. State general experience, age and whether married to Box AF329, FOUNDRY TRADE JOURNAL.

LARGE MODERN STEEL FOUNDRY in Yorkshire requires a CHIEF ENGINEER to be responsible for all maintenance duties and for a large development programme. Wide knowledge of heavy engineering together with civil engineering experience is desirable. This is a senior executive position and will be remunerated as such.

A non-contributory pension scheme is in operation and assistance towards housing will be provided if necessary.

Replies, giving details of education and experience, together with an indication of salary required, to Box LM338, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—cont

FOUNDRY TECHNICIAN

LANGLEY ALLOYS LIMITED
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INVITE APPLICATIONS from suitably qualified persons for the post of FOUNDRY TECHNICIAN. Applicants should have considerable experience in the production of small and medium size ferrous and non-ferrous castings. The position offers considerable scope and is offered to an energetic and capable man. Applications stating age and full details of qualifications and previous experience should be sent to the

COMPANY SECRETARY,
LANGLEY ALLOYS LIMITED,
Langley, Slough, Bucks

IRON MOULDERS WANTED. Gd. wages for experienced men. Ap. WALTER HOSKEN, LTD., Willow Wa. Bermondsey, S.E.1.

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Successful applicant, who will be paid salary and expenses will be required to operate from LEEDS and will be responsible direct to principal. Must have sound engineering background and possess current driving licence. Age 30-40.
Box No. AA 330. Foundry Trade Journal.

ASSISTANT METALLURGIST requi. by Ironfoundry in West Midlan. Applicants should primarily have expe. ence in sand control for a Mechana. Unit. Write giving full details experience, age and salary required. B. AM337, FOUNDRY TRADE JOURNAL.

F. H. LLOYD.

SITE ENGINEER.

A Site Engineer is required by F. H. Lloyd and Company Limited to take charge of the erection and installation of a steel foundry for the Indian Railway Board at Chittaranjan, West Bengal, India, for which F. H. Lloyd and Company Limited are acting as consultants.

Candidates should have similar experience on a major construction site, preferably overseas, and have a high degree of technical competence and executive ability. A professional engineering qualification would be an advantage.

Before leaving for India the selected applicant will be required to work initially at F. H. Lloyd and Company Limited, Wednesbury, and thereafter to India, for a period of up to five years. The post is advertised as a permanent career with F. H. Lloyd and Company Limited if the applicant so wishes.

Salary will be equivalent to £3,000 per annum, tax free in India. Accommodation in India will be provided and generous leave facilities will be arranged.

The appointment is subject to the applicant satisfying the conditions imposed by the Indian Railway Board.

Apply, giving full details, to Chief Engineer, F. H. Lloyd and Company Limited, G.P.O. Box 5, Wednesbury, Staffs, not later than 7th February, 1960.

FOUNDRY TECHNICIANS.

An unusual opportunity for a career in the steel Foundry Industry is offered for technicians who are capable of going out to India for a period of 3 to 5 years and operating a steel foundry being built by F. H. Lloyd and Company Limited, for the Indian Railway Board at Chittaranjan in West Bengal, India.

Education qualifications preferred are Higher National Certificate or equivalent in a scientific subject.

Remuneration which would be tax free in India will be according to age and experience.

Accommodation and generous leave facilities will be arranged.

Apply in confidence, giving full details to: Labour Manager, F. H. Lloyd and Company Limited, G.P.O. Box 5, Wednesbury, Staffs.

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SITUATIONS VACANT—*contd.*

FOUNDRY ENGINEER and DESIGN DRAUGHTSMAN required by Cole—Wallwork Foundry Equipment Division of Stone—Wallwork Ltd. Applications giving full details of previous experience to be submitted to 32, Victoria Street, S.1.

DEVELOPMENT ENGINEER required for well known Engineering Company expanding existing Foundry capacity. Applicants must have experience of machine design covering mass production of small castings, plant layout and be capable of seeing projects through from drawing board to full production, educated to H.N.C. Write, stating full details of experience and salary required to Box 4334, FOUNDRY TRADE JOURNAL.

ASSISTANT FOREMAN, preferably of about 30, experienced in repetition production of small grey iron castings, required for well-known mechanised foundry in West Midlands. Good prospects. Reply giving details of education, experience and salary to Box AF335, FOUNDRY TRADE JOURNAL.

NORTHROP

APPOINTMENT OF FOUNDRY SUPERINTENDENT

Applications are invited for the position of Foundry Superintendent. Theoretical training and extensive practical experience in all aspects of the production of Grey Iron Castings is essential. Additionally, experience in non-ferrous casting, shell and CO$_2$ methods would be an advantage. Preferably applicants should be in the age group 35-45.

Applications to be Addressed to:
General Manager,
Foundry Division,
BRITISH NORTHROP LIMITED,
BLACKBURN

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SMALL IRON FOUNDRY, jobbing or repetition, required in Birmingham or West Midland area. Full details of capacity, floor area, etc., in confidence to OWERS, MILLICHAMP & Co., Chartered Accountants, 6, Waterloo Road, Wolverhampton.

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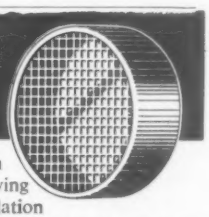

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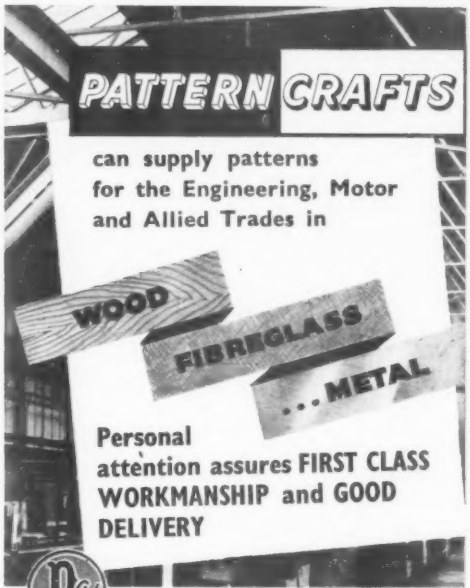

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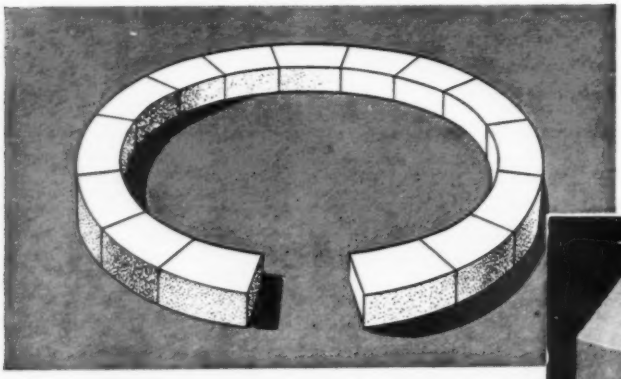

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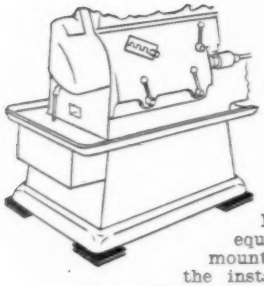

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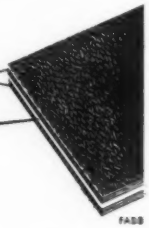

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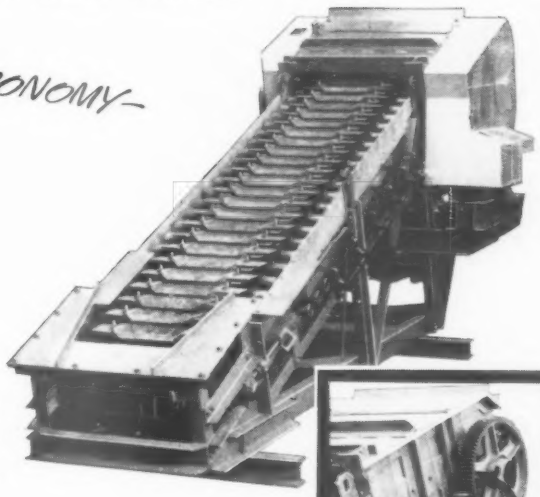

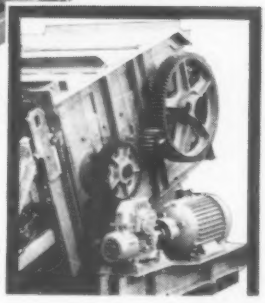

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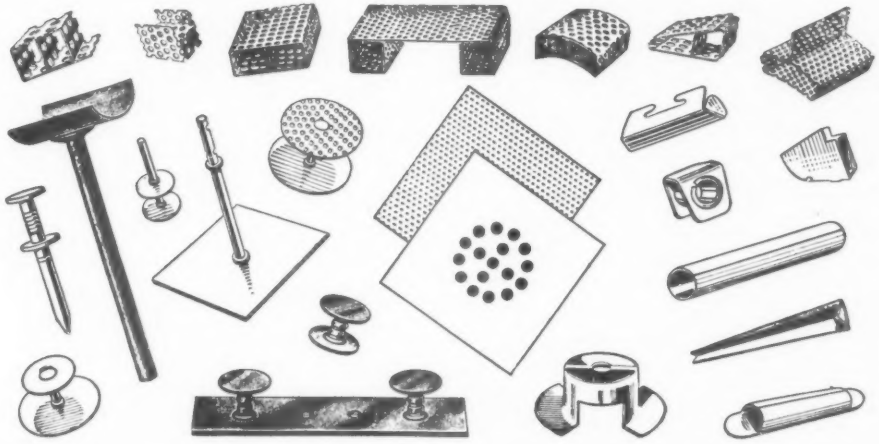

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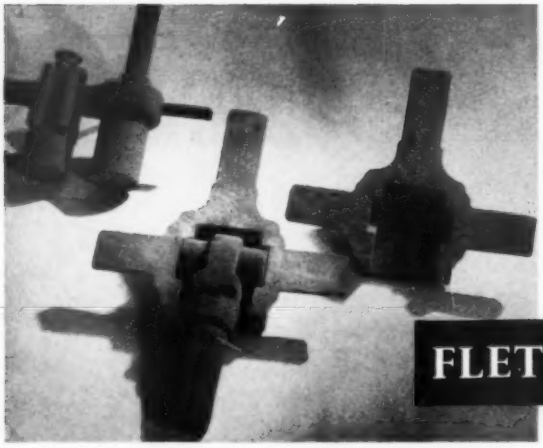

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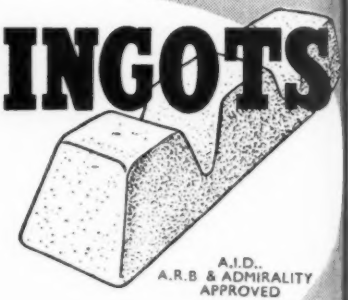

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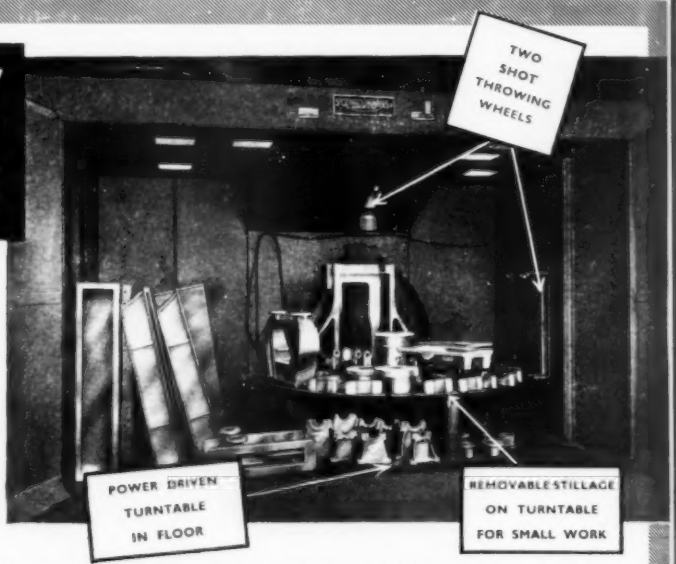

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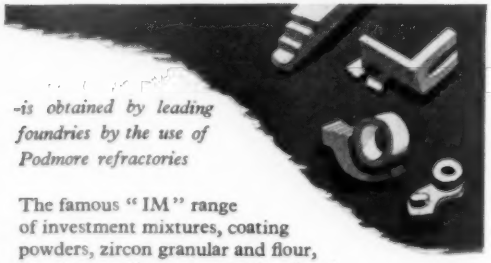

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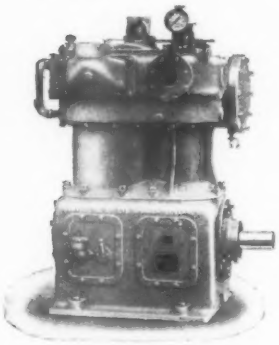

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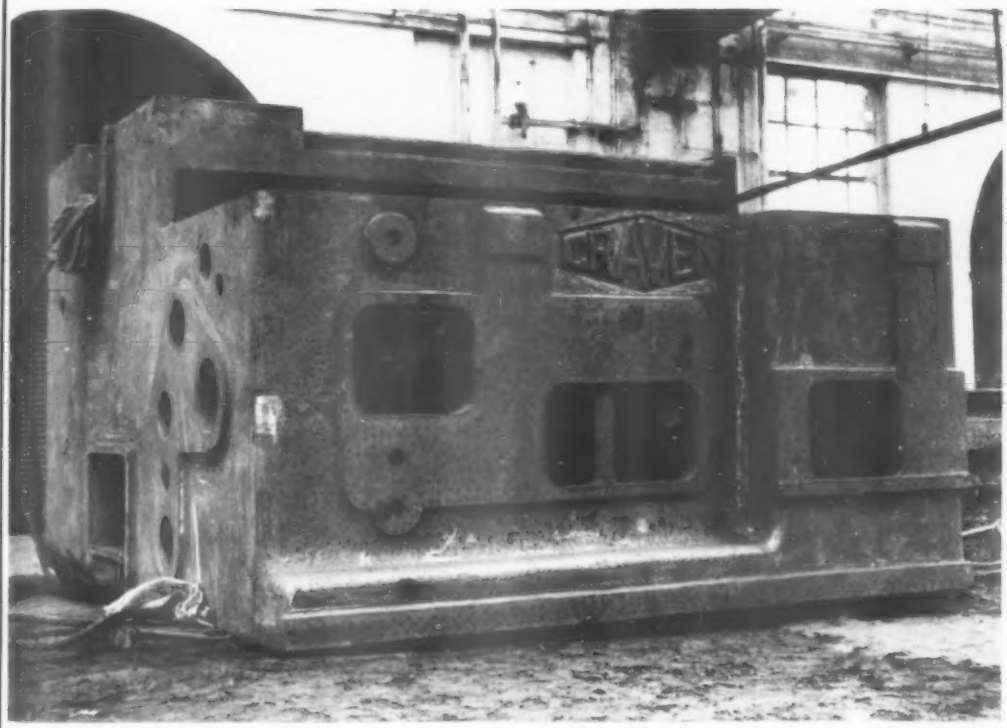

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